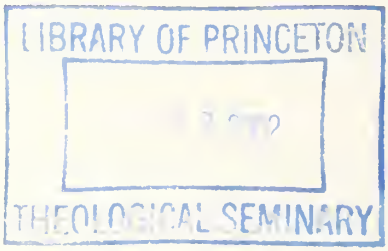
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THE

JOURNAL

OF

THE ASIATIC SOCIETY

OF

BENGAL.

VOL. I.

THE

JOURNAL

OF

THE ASIATIC SOCIETY

OF

BENGAL.

EDITED BY

JAMES PRINSEP, F. R. S.

SECRETARY OF THE PHYSICAL CLASS, ASIATIC SOCIETY.

VOL. I.

JANUARY TO DECEMBER,

1832.

"It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science, in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta; it will languish, if such communications shall be long intermitted; and it will die away, if they shall entirely cease."

SIR WM. JONES.

Calcutta:

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1832.

TO

CAPTAIN JAMES D. HERBERT,

Bengal Infantry,

LATE

DEPUTY SURVEYOR GENERAL OF BENGAL, AND SUPERINTENDENT OF REVENUE SURVEYS;

AT PRESENT HOLDING THE APPOINTMENT OF

ASTRONOMER TO HIS MAJESTY

The King of Oude:

WHOSE JUDGMENT ORIGINATED; WHOSE PERSEVERANCE AND EXERTIONS SUCCESSFULLY ESTABLISHED; AND WHOSE SUPERIOR ABILITIES SUPPORTED FOR 3 YEARS,

THE FIRST JOURNAL

IN INDIA

DEVOTED TO THE EXCLUSIVE PUBLICATION

OF

GLEANINGS IN SCIENCE;

THIS VOLUME,

IN ALL RESPECTS, BUT TITLE, A CONTINUATION OF HIS OWN WORK,

IS

Inscribed,

BY HIS ATTACHED FRIEND,

THE EDITOR.

CALCUTTA,
January 1, 1833.

PREFACE.

The Asiatic Society, on the 7th March, 1832*, passed a resolution, that the monthly journal hitherto published under the name of "Gleanings in Science," should be permitted to assume that of Journal of the Asiatic Society, and to continue it as long as the publication remains under the charge of one or both of the Secretaries of the Society. This privilege has, as it was anticipated, been the means of extending very considerably its circulation, while it has given a character and authenticity to the work, by its connection with an institution of established literary reputation, which no anonymous magazine, however well conducted, could hope to command.

The advantages of extended circulation have reacted to the benefit of subscribers, by enabling the Editor to increase the quantity of letter press from 400 to nearly 600 pages; and yet so constant has been the growing support of its contributors, that the pages of the Journal have been devoted, with few exceptions, to the insertion of original communications.

To many readers it would doubtless have been preferable that the Journal should contain more copious extracts from English scientific periodicals, which are not procurable in the interior of India; but conceding that, as an organ of Indian scientific intelligence, it must obviously derive its only merit among the many similar periodicals of the present day, from its stores of *oriental* literary and physical research, it will be generally acknowledged, that the first object of the work should be to give publicity to such oriental matter as the antiquarian, the linguist, the traveller, and the naturalist may glean, in the ample field open to their industry in this part of the world. While acting

* The January number was not published until the middle of March.—Since then exertions have been made to bring up arrears, and in future each monthly number will appear with regularity on the 10th of the following month; the insertion of the meteorological register rendering an earlier issue impossible.

on this principle, however, the Editor has not lost sight of the great utility of following, as far as means would permit, the progress of the various sciences at home, especially such as are connected in any way with Asia; the only limits thereto being want of space, and want of time to peruse and extract from the vast number of publications of the present day. Want of room also precluded the possibility of republishing the proceedings of the Medical and of the Horticultural Societies; but this had become less urgent since both of those useful bodies adopted the excellent rule of giving early publicity to their own proceedings and records.

To the Asiatic Society THE JOURNAL has naturally looked for its most frequent and interesting communications; and in consequence of its more intimate connection with that Institution, the proceedings of that body have been given in greater detail than heretofore, so that absent members may learn exactly what passes at its meetings, and what accessions are made from time to time to its library and its museum. Many absent members have complained of the quarterly subscriptions they were heretofore called upon to pay, while they remained in ignorance of what was going forward; this source of objection is now obviated, and perhaps a still greater amendment may yet be effected for their benefit, by an arrangement that all-members of the Society shall receive a copy of the Journal gratis, which will reduce their annual payments nearly one fourth.

It is unnecessary to recapitulate the contents of the present volume, or to allude in anonymous praise to those who have favored its pages with their assistance; since the authors have, in most cases, on suggestion, permitted their writings to be authenticated by the insertion of their names, as should always be the case in matters of fact, observation, and research. One illustrious name however must not be passed over without a tribute of gratitude for its valued and frequent contributions, a tribute more sincerely paid, since India has now lost the power and the claim to their continuance; she has resigned her most eminent oriental scholar to climes where his talents may find more genial appreciation, but where they cannot excite more respect or admiration, than they will ever command in the land which called forth their energies and directed their application.

The learned Societies at home will be proud to publish the continuation of the *Analyses of the Purânas*, of which the four first have appeared in these pages. Abstracts of four only were ready for the press, but translations of the remainder of the eighteen *Purânas* themselves had been completed under the superintendence of Professor Wilson, before he quitted India.

Mr. Alexander Csoma's indefatigable labour, in opening to us a first acquaintance with the literature of Tibet, will be estimated as it deserves by literary men—a contracted circle perhaps, because deep erudition and study are requisite to form critics capable of appreciating the nature and bearing of his peculiar researches upon the history, languages, and religions of other nations, both ancient and modern. All may however feel sensible of the devotion, zeal, and perseverance, which are necessary to lead a man, alone and unpaid, into a distant and wild country, to learn its language, and study its people at the fountain head. The volumes of notes which Mr. Csoma has presented to the Asiatic Society, will, it is hoped, be published in their Researches at length.

In furtherance of the desire of the Government, the greater part of Dr. Buchanan's Statistics of Dinajpúr has been printed in a detached form, as commenced by the Editor of the GLEANINGS; and to complete the work more speedily, two extra numbers have been issued in the course of the year. It will be remarked, that there are many plates referred to in the text: the drawings alluded to are in possession of the Honorable Court of Directors, along with the original manuscripts; it was thought better to preserve the references, in case the Hon'ble Court might hereafter be persuaded to publish them, either in a separate form, or of a size adapted to the present edition. It must not be forgotten, that it is this undertaking which gained to the GLEANINGS the valuable privilege of free postage through the Bengal Presidency. The Editor is happy to announce, that the same boon has, in the most liberal manner, and without any solicitation, been extended to the Presidency of Bombay and to the Government of Ceylon, by their enlightened Governors, His Excellency the Earl of CLARE, and the Right Honorable Sir R. W. HORTON, to whom his thanks are thus publicly and respectfully addressed.

To his numerous correspondents, the Editor can but proffer thanks for past, and solicitations for future, support, bidding them remember that, the scope and object of this publication embraces the literature, the manners, the geography, physical and mineral, the arts, the natural productions of Asia, the phenomena of its climate, and observations of the heavens. In the words of the illustrious founder of the Asiatic Society, " the bounds of its investigation will be the geographical limits of Asia; and within these limits its inquiries will be extended to whatever is performed by man or produced by nature."

Dedicated, by permission, to

LADY W. C. BENTINCK,

A

TREATISE

ON

THE MUSIC OF HINDOOSTAN,

COMPRISING A DETAIL OF

THE ANCIENT THEORY

AND

MODERN PRACTICE.

THE similarity of the music of Egypt and Greece to that of this country has been traced and pointed out: harmony and melody have been compared: and time noticed. The varieties of song have been enumerated, and the character of each detailed: a brief account of the principal Musicians superadded, and the work concluded with a short alphabetical glossary of the most useful musical *Terms*.

BY

CAPTAIN N. WILLARD,

Commanding in the Service of H. H. the Nuwab of Banda.

Price to Subscribers, Sa. Rs. 8.

PROSPECTUS.

A TREATISE on the Music of Hindoostan was much wanted. The scanty information obtainable through the channels of Dr. GILCHRIST and Sir WILLIAM JONES, are neither of themselves sufficient to fill this chasm, nor do they elicit light sufficient to enable one to grope through the various obscure writings in the vernacular languages and dialects. The songs set to music by Mr. BIRD and Mr. WALKIER, are of the more modern style, and not of the ancient school; so that, instead of elucidating the theory, they lead us into confusion, when compared with the tables of Rags and Raginees given by Sir W. JONES.

The forthcoming work has been written with the view of describing in some measure, the theory and practice of the original music of Hindoostan, but chiefly to unfold the beauties of which it is susceptible. The extravagant eulogium offered to the music of ancient Greece, and the striking similarity which appeared to the author to exist between that and the subject to be treated of in this work, has led him to point them out, in the hope that, should a taste for the music of this country obtain among the professors of the science in Europe, it might perhaps conduce to the elucidation and revival of a much-desired and lost branch of knowledge, namely, the music of ancient Egypt and Greece.

For this purpose it appeared to the author, that a bare translation of any of the existing native works would not suffice. All who have been taught music are so much accustomed to the European way of explaining it, that every other must necessarily appear uncouth and preposterous. In the arrangement of this work, therefore, the European system has been adopted.

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PREFACE. A general view of the plan and contents of the work.

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HINDOOSTANEE MUSIC. What it is termed in the original. The treatises held in the greatest estimation. Native divisions what, and how many. The arrangement adopted in this work.

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Of the various species of Vocal Compositions of Hindoostan. Twenty different species described.

Of the Peculiarities of Manners and Customs in Hindoostan, to which allusions are made in their song. Its characteristic nature. Reasons assigned for several of them, which now no longer exist, and examples produced.

Brief account of the most celebrated Musicians of Hindoostan.

Glossary of the most useful musical terms.

N. B. *The work will be printed on superior English paper, at the Baptist Mission Press, Calcutta.*

Subscriptions will be received by Mr. A. Jewell, Moorghehuttah, and Messrs. Thacker and Co. St. Andrew's Library.

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—— 19 — 16 *from bottom, for* "3, 4, 5," *read* "1, 2, 3, 4."
—— 20 — 8 *from top, for* "plate 1," *read* "plate 2."
—— 20 — 9 *for* "he protracted," *read* "the protracted."
—— — — 11 *for* "BB′ B′," *read* "B″ B′."
—— — — 16 *for* "intercepts," *rsad* "intersects."

AND

In Fig 2, *plate II.* continue the dotted arc 1′ 1 *a″* to *a′*.
The line A *c′* continue to *c*.

—— 28 — 7 *from top, for* "manima," *read* "minima."
—— — *at bottom, for* "Artesien," *read* "Artesian."
—— 33 — 7 *for* "January," *read* "February."
—— 410 — — *in last column* of Table II. *for* "2m. 58s. 8," *read* "0m. 58s. 8."
—— 46 — 18 *from top, after* "which" *insert* "comma."
—— — — — ———————— "either" ditto.
—— 47 — 2 *from top, for* "have," *read* "has."
—— 57 — 12 *for* "$99\frac{1}{4}$ $99\frac{1}{2}$ $99\frac{3}{4}$," *read* "99^{1} 99^{2} 99^{3}."
—— 59 — 24 *and throughout the article, for* "sack," *read* "sac."
—— 60 — 4 "orbitar," *read* "orbital."
—— — — 10 "interval," *read* "internal."
—— — — 29 "lips," *read* "tips."
—— — — 34 *dele* "by."
—— 60 — 15 *for* "compressed and hard; before," *read* "compressed and hard before ;"
—— — — 28 *for* "lips," *read* "tips."
—— 62 — 11 *for* "this Chiru," *read* "the Chiru."
—— 63 — 10 *for* "bambdoidal," *read* "lambdoidal."
—— — — 14 *for* "malars," *read* "molars."
—— 65 — 8 *for* "$1\frac{1}{8}$," *read* "$\frac{3}{16}$."
—— 67 — 2 *from bottom, after* "than," *read* "the."
—— 74 — 15 *for* "9°," *read* "9h."
—— 75 — 21 *dele* "rufous," repeated.
—— 79 — 17 *from bottom, for* "done," *read* "donc."
—— 148 — — *foot note, for* "Rutboo," *read* "Kubboo."
—— 226 1st par. 5th line *for* "Ekadantashtra," *read* "Ekadanshtra,"
—— 226 4th „ 4th — *for* "Kridama," *read* "Srid'ama"
—— 229 2nd „ 5th — *for* "Vrishapati," *read* "Vrihaspati."
—— 231 — „ 3rd — *for* "Viswasé na" *read* "Viswakerma."
—— 238 — „ *after* "Ganges river," *insert* "at Gházipur."
—— 245 10 „ *from bottom, for* "it," *read* "the mirror."
—— — 1st „ 7th — *for* "He having," *read* "Having."
—— 296 line 3 *for* "but mostly," *read* "and,—"
—— — — 7 *for* "hydrogen. When," *read* "hydrogen, where."
—— 305 — 20 *for* "circumference," *read* "diameter."
—— — — 21 *for* "$27\frac{1}{2}$ rupees," *read* "$2\frac{1}{2}$ rupees."

Errata in Meteorological Register, for June.

Date	Hour.	Bar.		
13	Sun-rise,	*for*	,365	*read* ,465
14	„		,399	,499
22	„		,517	,617

Add 0,010 to all the figures in the Barometrical column for 10½ P. M.

—— 340 — 6 *after* "*Rhinolphus*," *insert* "and two species of *Vespertilio*."
—— 355 — 13 *for* "ακανσα," *read* "ακανστα."
—— 355 — 2 *from bottom, after* "*nílam*," *insert* "*níl mani*, (or *manik*.)"
—— 356 *after* "College of Fort William," *insert* "the word *bahrmani* is also used in the *Khawás-ul* [illegible]*ír*, as a variety of the *yaqút*."
—— 358 — 20 *dele* "or a species of garnet."
—— 358 — 22 *for* "*manik*," *read lálrí*."
—— 403 — 5 *from bottom, for* "ΔΙΟΚΛΠ," *read* "ΔΙΟΚΛΗ."
—— 404 — 14 *for* OVA," *read* "OTA."
—— 411 — 8 *for* "Latitude 25° 43′," *read* "Lat. 25° 47′ 26″."

In Table IV. of the Estimate of Life in India, page 284, the first four figures in the second and third column should stand thus:

Age.	Survivors.	Deaths.
20	52221	473
21	51748	489
22	51259	522
23	50737	557

The mistake arose from the calculations having originally been made to commence with the age of nineteen, instead of twenty: and the 5 year averages in Table III. page 283, will all be slightly affected by the same cause. The last figure in the second column, page 284, should be reversed; and in the last column but one, *for* "2080," *read* "2008."

Line 414 line 3 *from below, for* "molluscæ," *read* "mollusca."
—— 444 — 36 *after* "ministry," *insert* "of a man."
—— 445 — 3 *from below, for* "2125," *read* "212.5."
—— 446 — 7 *for* "in bullion," *read* "bullion."
—— 447 — 21 *for* "will be," *read* "would be."
—— — — — *after* "at any," *insert* "rate."
—— 480 — 15-16 *for* "Tariqa-i-Chishíta," *read* "Tarîqa-i-Chishtía."
—— 483 — 36 *for* "lost about," *read* "tost about."
—— — — 39 *for* "Mújtahid-i-mústuqill," *read* "Mújtahid-i-mústaqill."
—— 485 — 20 *for* "Taqwíat-ul-Imám," *read* Taqwíat-ul-Imán."
—— 487 — 15 *erase* "5" at beginning of line.
—— 488 — 7 *for* "differences," *read* "difference."
—— 489 — 20 *for* "Káfr," *read* "Kufr."
—— 491 — 23-24 *for* Ishrák f'il Tasarraf," *read* "Ishrák f'il Tasarruf."
—— 492 — 10-11 *for* "the authority or influence of Saints, as respecting intercessors," *read* "respecting the authority or influence of Saints as intercessors."
—— 498 — 23 *for* "Khátim," *read* "Khátima."
—— 501 — 12 *after* "A B C," *insert* "[fig. 5.]"
—— 505 — 20 *for* "5 53 59," *read* "5 52 59."
—— 506 — 11 [illegible] "5 53 10," *read* "5 53 27."

JOURNAL

OF

THE ASIATIC SOCIETY.

No. 6.—*June*, 1832.

I.—*Analysis of the Puránas.* *By* H. H. Wilson, *Sec. As. Soc.*

[Read at the Meetings of the Society.]

2. The Brahmá Vaivertta Puráṇa.

The *Brahmá Vaivertta Puráṇa* is perhaps the most decidedly sectarian work of the whole collection, and has no other object than to recommend faith in Krishṇa and Rádhá: subservient to this purpose, it records a great variety of legends, of which no traces can be found, in any of the other *Puránas*, and it deals but sparingly in those which are common to all. It is of little value as a collateral authority, therefore, and most of the stories, it contains, are too insipid and absurd to deserve investigation. It contains, however, a few remarkable passages, that bear an ancient character, and it throws more light than any similar work upon the worship of the female principle or *Prakriti*, as well as of Krishṇa and Rádhá.

The *Brahma Vaivertta* is supposed to be communicated by Sauti, the son of Su'ta, the original narrator of the *Puránas*, to Saunaka, a sage, at an assembly of similar characters, at the forest of *Naimisha*, whom he happens to visit, and who ask him to relate the work. This commencement opens several of the *Puránas*, and more especially the *Máhátmyas* or chapters, descriptive of the virtues of some place or person, said to be taken from some *Puráṇa*. In this case, the *Rishis* state, as the motive of their inquiry, their dread of the evil tendency of the present age, and their desire for emancipation; and their hope to be secured in the one, and defended from the other, by being imbued with *Bhakti*, or faith in Hari, through the medium of the *Puráṇa*, which they style the essence of the *Puránas*, the source of faith, feli-

city, and final liberation, and the dissipator of the errors of the *Puránas*, and the *Upapuránas*, and even of the *Vedas!*

SAUTI acquired his knowledge of this work from VYÁSA, by whom it was arranged in its present form, to the extent of eighteen thousand *Slokas*. VYÁSA received the *Sutra*, the thread or outline of it, from NÁREDA, who had learnt it from NÁRÁYANA *Rishi*, the son of D'HERMA, to whom it had been communicated by his father. D'HERMA had been made acquainted with it by BRAHMÁ, who had been taught it by KRISHNA himself, in his peculiar and deathless sphere, the celestial *Goloka*:—a paradise, it may be observed, of which no trace occurs in any other *Purána*. The *Brahma Vaivertta* is so named, because it records the manifestations of the Supreme Being in worldly forms, by the interposition of KRISHNA, who is himself the Supreme Spirit, the *Parabrahma* or *Paramátmá*, from whom *Prakriti*, BRAHMÁ, VISHNU, S'IVA, and the rest proceeded.

The *Brahma Vaivertta Purána* is divided into four books or *K'handas*, the *Brahmá K'handa*, the *Prakriti K'handa*, the *Ganes'a K'handa*, and the *Krishna Janma K'handa*, treating separately of the nature and acts of the supreme; of the female personification of matter; of the birth and adventures of *Ganes'a*; and of the birth and actions of *Krishna*. We shall notice the principal subjects of each division.

The *Brahma K'handa* begins with the creation of the universe, as taking place after an interval of universal destruction. The world is described as waste and void, but the Supreme KRISHNA, the sole existent and eternal Being, is supposed to be present, in the centre of a luminous sphere of immeasurable extent, and inconceivable splendor. From him the three qualities, crude matter, individuality, and the elements proceed; also NÁRÁYANA or the four-armed VISHNU, in his ordinary garb and decorations, and SANKARA, smeared with ashes, and armed with a trident. NÁRÁYANA or VISHNU comes from the right, and SIVA from the left side of the primeval KRISHNA, and BRAHMÁ springs from his navel: all the gods and goddesses in like manner proceed from his person, and each upon his or her birth utters a short prayer or hymn in honour of him: the following are the salutations of the three principal persons of the *Hindu* pantheon.

NÁRÁYANA'S *address to* KRISHNA.

"I pay reverence to the cause of causes, to him who is at once the act and the object, the superior boon, the giver and meriter, and source of blessings; who is religious austerity, and its everlasting fruit, and himself the eternal ascetic; who is beautiful, black as a new cloud; delighted in his

own spirit; who is void of desire, who assumes forms at will, who annihilates the five desires, and who is the cause of desire; who is all things, the lord of all things, and the unsurpassed form, which is the seed of all things; who is embodied in the *Vedas*, who is the seed of them, the fruit of the *Vedas*, and its bestower; who is learned in the *Vedas*, the ritual they enjoin, and the best of all who are conversant with their doctrines."

Siva's *address.*

"I adore him, the invincible, the giver, the lord and cause of victory, the best of the bestowers of victory, and victory itself; who is the lord and cause of all things, lord of the lord of all things, and cause of the cause of all things; who is present in all, who upholds all, who destroys all, generates all, who is the cause of the preservation of all, who is all things; who is the fruit, the giver of the fruit, its seed, and its support; who is identical with light, the irradiator of all, and supreme of all those who shine with divine radiance."

Brahmá's *address.*

"I adore Krishna, who is free from the three qualities, the one imperishable Govinda, who is invisible and void of form, who is visible and assumed the shape of a cowherd, who seems a youth in years, who is of mild deportment, the beloved of the *Gopis*, of lovely aspect, black as a new cloud, and beautiful as a myriad of Kanderpas. Inhabiting the place of the *Rása* in his sojourn in the groves of *Vrindávan*, the lord of the mystic dance, and its performer, and the delighter in the graces of its evolutions."

The other divinities continue in the same strain, and the tendency of the hymns furnishes a key to the whole work, the object of which is to identify the cowherd of *Vrindavan*, with the supreme cause of the world, or to claim for Krishna a rank which the followers of Vishnu and Siva demand, exclusively, for the object of their respective adoration: with much more reason it must be confessed; for the actions of Krishna are even still more preposterously incompatible with a divine character than those of his competitors for pre-eminence.

After the several deities are produced from various parts of Krishna's person, he retires into the *Rásamandala*, a chamber or stage for the performance of a kind of dance, to which the followers of this divinity attach much importance, although it seems to be no more than a kind of dramatic representation of Krishna's dancing and sporting with the *Gopis*. There, Rádhá, his favourite mistress, proceeds from his heart; from the pores of her skin spring three hundred millions of *Gopis*, or nymphs of *Vrindávan;* and an equal

number of *Gopas*, the swains of the preceding, originate from the pores of KRISHNA's skin; the herds they are to attend owe their existence to the same inexhaustible source. The *Rása* and RÁDHÁ, and the origin of the kine, and their keepers, male or female, are amongst the chief characteristic peculiarities of the *Brahma Vaivertta Purána.*

After KRISHNA's thus evolving the different orders of subordinate deities, the work proceeds to describe the devotion of SIVA towards his creator, and takes this opportunity of expatiating upon the different degrees of *Bhakti*, or faith, and the various kinds of *Mukti*, or salvation.

The work of creation is then resumed by BRAHMÁ, who begets by his wife SÁVITRI', a various and odd progeny, as, the science of logic, the modes of music, days, years, and ages, religious rites, diseases, time, and death. He has also an independent offspring of his own, or VISWAKERMÁ, from his navel; the sage SÁNANDA, and his three brothers, from his heart; the eleven *Ru'dras* from his forehead, and sundry sages from his ears, mouth, &c.

The legends that follow relating to the daughters of DHARMA, and their marriages with various patriarchs, from whom terrestrial objects proceeded, are told in the usual strain. In describing the origin of the mixed classes of mankind, this work contains a peculiar legend, which makes a certain number of them, the issue of the divine architect VISWAKERMÁ by GHRITÁCHI', a nymph of heaven. The chapter often occurs as a separate treatise under the title of *Játi Nirnaya*, and is considered as an authority of some weight, with respect to the descent of the mixed tribes, although of a purely legendary character.

The succeeding sections contain some legends of little importance, until the 16th, which is occupied with a short, but curious list of medical writers and writings. The first work on medical science entitled the *A'yur Veda* was, like the other *Vedas*, the work of BRAHMÁ, but he gave it to *Súrya*, the sun, who, like the *Phœbus* of the Greeks, is the fountain of medical knowledge amongst the *Hindus*. He had sixteen scholars, to each of whom a *Sanhitá* or compendium is ascribed: none of the works attributed to them are now to be procured.

The chapters that next follow, relate a legendary story of the wife of a *Gandherva* named MÁLAVATI', the efficacy of various *Mantras*, the story of NÁREDA, the sage, and rules for the performance of daily purificatory and religious rites. The 28th and 29th chapters, the last of the book, are occupied with the description of KRISHNA, of his

peculiar heaven or *Goloka*, of the holy *Rishi* NÁRÁYANA, and of his residence. The style and purport of the whole are peculiar to this *Purána*, and similar to the address of the deities, cited above. *Goloka* is said to be situated 500 millions of *Yojanas* above the *Lokas* of SIVA and VISHNU. It is a sphere of light, tenanted by *Gopas*, *Gopis*, and cows; the only human persons admissible to its delights are pure *Vaishnavas*, the faithful votaries of KRISHNA. It appears, however, that the author of this *Purána*, who in all probability is the inventor of *Goloka*, had no very precise notions of his own work, as he calls it in one place square, and in another round; and whilst he is content in one passage to give it the moderate diameter of 30 millions of *Yojanas*, he extends its circumference in another to a thousand millions.

The next section of this *Purána*, is also of a peculiar character. It relates to *Prakriti*, the passive agent in creation, personified matter, or the goddess nature. The *Puránas*, in general, follow in regard to their cosmogony the *Sánkhya* school of philosophy, in which *Prakriti* is thus described: *Prakriti* or *Múla Prakriti* is the root or plastic origin of all, termed *Pradhána*, the chief one, the universal material cause. It is eternal matter, undiscrete, undistinguishable as destitute of parts, inferrible from its effects, being productive, but no production.

According to the same system, the soul is termed *Purush* or *Pumán*, which means man or male; but the *Sánkhya* doctrine is twofold, one atheistical, the other theistical. The former defines the soul to be neither produced nor productive, not operating upon matter, but independent and co-existent; the latter identifies soul with *Iswara*, or God, who is infinite and eternal, and who rules over the world: and it is to this latter system, that the *Puránas* appertain, only in this *Iswara* they recognise the peculiar object of their devotion, whichever of the *Hindú* triad that may be, or even as in the work before us, superadding a fourth in KRISHNA, who is every where else regarded but as a manifestation of VISHNU, and in a remarkable passage of the *Mahábhárat* is said to be no more than an *Avatár* of a hair plucked from the head of that divinity.

In the true spirit of mythology, which is fully as much poetical as religious, the figure of prosopopeia is carried by the Hindus to its utmost verge; and we need not wonder therefore to find spirit and matter converted by the *Pauránic* bards into male and female personifications, with the attributes adapted to either sex, or derived from the original source of either representation. *Prakriti* is consequently held to be not only the

productive agent in the creation of the world, but she is regarded as *Máyá*, the goddess of delusion, the suggester of that mistaken estimate of human existence, which is referable to the gross perceptions of our elementary construction. With this character the *Pauránics* have combined another, and confounding the instrument with the action, matter with the impulse by which it was animated, they have chosen to consider *Prakriti* also as the embodied manifestation of the divine will, as the act of creation, or the inherent power of creating, co-existing with the supreme. This seems to be the ruling idea in the *Brahma Vaivertta*, in which the meaning of the word *Prakriti*, and the origin of this agent in creation, are thus explained :—

"The prefix *Pra* means pre-eminent, *Kriti* means creating; that goddess who was pre-eminent in creation, is termed *Prakriti:* again, *Pra* means best, or is equivalent to the term *Satwa*, the quality of purity, *Kri* implies middling, the quality of passion, and *Ti* means worse or that of ignorance. She who is invested with all power is identifiable with the three properties, and is the principal in creation, and is therefore termed *Prakriti. Pra* also signifies first or foremost, and *Kriti* creation; she who was the beginning of creation, is called *Prakriti.*"

"The supreme spirit in the act of creation became by *Yoga* twofold, the right side was male, the left was *Prakriti.* She is of one form with *Brahme.* She is *Máyá*, eternal and imperishable. Such as the spirit, such is the inherent energy (the *Sákti*), as the faculty of burning is inherent in fire."

The idea of personifying the divine agency, being once conceived, was extended by an obvious analogy to similar cases, and the persons of the *Hindú* triad, being equally susceptible of active energies, their energies were embodied as their respective *Prakritis, Saktis*, or goddesses. From them the like accompaniment was conferred upon the whole pantheon, and finally upon man; women being regarded as portions of the primeval *Prakriti.* The whole being evidently a clumsy attempt to graft the distinction of the sexes as prevailing in earth, hell, and heaven, upon a metaphysical theory of the origin of the universe.

The primeval *Prakriti*, according to our authority, which now becomes wholly mythological, resolved herself, by command of KRISHNA, into five primitive portions. These were DURGÁ, the *Sakti* of MAHÁDEVA; LAKSHMI, the *Sakti* of VISHNU; SARASWATI' the goddess of language; SÁVITRI, the mother of the *Vedas*, and RÁDHÁ, the favourite of KRISHNA.

In the same manner as the primary creator of the world multiplies his appearances, and without losing any of his individual substance, occupies by various emanations from it different frames, so the radical *Prakriti* exists in different shapes, and in various proportions, distinguished as *Ansas*, portions, *Kalas*, divisions, and *Kalánsas* and *Ansánsas*, or subdivisions, or portions of portions. Thus *Gangá*, *Tulasi*, *Manasá*, *Shash'thí*, and *Káli*, are *Ansa rúpas*, or forms having a portion of the original *Prakriti ; Swáhá*, *Swadhá*, *Dakshiná*, *Swasti*, a host of virtues and vices, excellences and defects, and all the wives of the inferior deities are *Kalárúpas*, forms constituted of a minor division of *Prakriti ;* whilst all the female race are animated by her minuter portions, or subdivisions, and they are virtuous or vicious, according as the quality of goodness, passion, or ignorance, derived from their great original, predominates, in the portion of which they are respectively constituted. Women who go astray, therefore, have by this system, a better excuse than the stars.

The compiler of this *Purána* is very little scrupulous as to the consistency of his narrative, and assigns to the principal goddesses other origins than that which he gives in the beginning of the *Brahmá K'handa*, or in the first chapter of this section. Thus Saraswatí', who came out from the mouth of Krishna in the former, and in the latter, is said to be one of the five subdivisions of *Prakriti*, is now described as proceeding from the tongue of Rádhá ; and Lakhsmí', who in one place is also a portion of *Prakriti*, and in another issues from the mind of Krishna, is described in this part of the work, as one of two goddesses, into which the first Saraswatí' was divided ; the two being Saraswatí' proper, and Kamalá or Lakshmí'. These incoherencies are quite characterstic of this *Purána*, which from first to last is full of contradictory repetitions, as if the writer was determined to make a large book out of a few ideas, the precise nature of which he forgot as fast as he committed them to paper.

After this account of the origin of the principal female forms, the third chapter contains a more particular description of the sphere of Krishna or *Goloka*. It then repeats an account of the creation of the world, through the agency of Brahmá ; and the following chapters of the section, are devoted to legendary stories of the principal *Prakritis*, or Saraswatí', Gangá, Tulasi, Sávitri, Lakshmi, Swáhá, Swadhá, Dakshiná, Shash'thí', Mangalá, Chandí', Manasá, Surabhi, Rádhiká and Durgá. In the course of these narratives various others are introduced, illustrative of the characters of gods, saints, heroes, and heroines, all tending to show the fervour with which

they worshipped KRISHNA. Accounts of *Goloka*, a description of hell, and an explanation of the chronological system of the *Puránas*, are interwoven; besides other subjects of a peculiar and legendary nature, conveying little information or amusement.

The third section of the *Brahma Vaivertta Purána* is the *Ganes'a K'handa*, giving an account of the birth and actions of that deity, in a series of legends, which are not of frequent occurrence, and are in a great degree, if not altogether, peculiar to the work.

PÁRVATI after her marriage with SIVA, being without a child, and being desirous to obtain one, is desired by her husband to perform the *Punyaka Vrata*. This is the worship of VISHNU, to be begun on the thirteenth day of the bright fortnight of *Mágha*, and continued for a year, on every day of which, flowers, fruits, cates, vessels, gems, gold, &c. are to be presented, and a thousand *Bráhmans* fed, and the performer of the rite is to observe most carefully a life of outward and inward purity, and to fix his mind on HARI or VISHNU. PÁRVATI having with the aid of SANATKUMÁRA, as directing priest, accomplished the ceremony on the banks of the Ganges, returns after some interval, in which she sees KRISHNA, first as a body of light, and afterwards as an old *Bráhmana*, come to her dwelling. The reward of her religious zeal being delayed, she is plunged in grief, when a viewless voice tells her to go to her apartment where she will find a son, who is the lord of *Goloka*, or KRISHNA, that deity having assumed the semblance of her son, in recompence of her devotions.

In compliment to this occasion, all the gods came to congratulate SIVA and PÁRVATI, and were severally admitted to see the infant: amidst the splendid cohort was SANI, the planet Saturn; who although anxious to pay his homage to the child, kept his eyes stedfastly fixed on the ground. PÁRVATI asking him the cause of this, he told her, that being immersed in meditation upon VISHNU, he had disregarded the caresses of his wife, and in resentment of his neglect, she had denounced upon him the curse that whomever he gazed upon he should destroy: to obviate the evil consequences of this imprecation he avoided looking any one in the face. PÁRVATI having heard his story paid no regard to it, but considering, that what must be, must be, gave him permission to look at her son. SANI calling DHERMA to witness his having leave, took a peep at GANE'SA, on which the child's head was severed from the body, and flew away to the heaven of KRISHNA, where it reunited with the substance of him, of whom it was part. DURGA' taking the headless trunk in her arms, cast herself, weeping

on the ground, and the gods thought it decent to imitate her example, all except VISHNU, who mounted *Garura*, and flew off to the river *Pushpabhadra'*, where finding an elephant asleep he took off his head, and flying back with it, clapped it on the body of GANE'SA; hence the body of that deity is crowned with its present uncouth capital. On the restoration of GANE'SA to life, valuable gifts were made to the gods and *bra'hmans*, by the parents, and by PÁRVATI's father, the personified *Himálaya*. The unfortunate SANI was again anathematised, and in consequence of the curse of PÁRVATI, has limped ever since.

These legends and others of minor importance, with the various prayers and addresses of the deities, occupy the first 13 chapters. The next five give an account of the birth of KARTIKEYA. In the 19th and 21st chapters the reason why GANE'SA's head was lopped off is given. SIVA offended with ADITYA, the sun, slew him, and although he restored him to life, incurred the wrath of the sage KA'SYAPA, who doomed his (SIVA's) son to lose his head. The elephant was INDRA's elephant, and was decapitated because INDRA threw over his neck the garland of flowers, which the sage DURVÁSAS gave him, and the disrespect of which, with the consequent degradation of INDRA, is noticed in various *Puránas*, although in all other respects with different results. INDRA was no loser of an elephant by his decapitation, as VISHNU, moved by the prayers of his mate, gave him another head in place of that which he took away. The humiliation of INDRA, and his recovery of LAKSHMI' or glory, are the subjects of the next five chapters, and the remaining half of this section is occupied with the story of GANE'SA's losing one of his tusks. It was broken off by PARASURÁMA, and the occurrence therefore involves his history, and that of his ancestor BHRIGU, the possession of the all-bestowing cow by JÁMADAGNI, the attempt to carry her off by the king KÁRTAVIRYA'RJUNA; the conflict that ensued, and the death of the sage; PARASURÁMA's avenging his father's loss, by slaying KÁRTAVIRYÁRJUNA; his combats with the kings, who came to the aid of that prince; and the destruction of the military race.

After this last exploit, PARASURÁMA, who was a favourite disciple of SIVA, went to *Kaila'sa* to visit his master; on arriving at the inner apartments, his entrance was opposed by GANE'SA, as his father was asleep. PARASURÁMA nevertheless urged his way, and after a long and absurd dialogue, in which devotion to KRISHNA is most abruptly and diffusely introduced, the parties came to blows. GANE'SA had at first the advantage, seizing PARASURA'MA in his trunk, and giving him

a twirl that left him sick and senseless ; on recovering, RÁMA threw his axe at GANE'SA, who recognizing it as his father's weapon (SIVA having given it to PARASURÁMA), received it with all humility upon one of his tusks, which it immediately severed, and hence GANE'SA has but one tusk, and is known by the names *Ekadanta* and *Ekadantashtra*, (the single-tusked.) PÁRVATI was highly incensed with PARASURÁMA, and was about to curse him, when KRISHNA, of whom he was the worshipper, appeared as a boy and appeased her indignation. This part of the work ends with a recapitulation of the names of GANE'SA, his quarrel with TULASI, in consequence of an imprecation from whom it was, that he lost one of his tusks ; PARASURÁMA's adoration of him, and retiring to lead an ascetic life.

The last section, the *Krishna Janma K'handa*, is very voluminous, containing 132 chapters. It gives an account of KRISHNA's birth and adventures, as narrated by NÁRÁYANA to NARE'DA.

The narrative is introduced by a panegyric of the individual, who is a real *Vaishnava*, or thoroughly devoted to KRISHNA : and who consequently becomes endowed with all knowledge and virtue, acquires superhuman faculties on earth, is elevated to the region of KRISHNA after death, and liberates himself, and seven generations above and below him, from the penalty of regeneration. All crimes avoid him, or are consumed in his purity, like moths in a lamp ; and any one meeting him on the road, is thereby cleansed of the sins he may have contracted for seven preceding lives ; no course of religious practices, or devout penances is necessary to the attainment of such miraculous excellence, and the love of HARI or KRISHNA is the only condition required. He who has received the initiatory *mantra*, who repeats the name of that divinity constantly, who transfers to him every worldly desire and possession, whose thoughts ever dwell upon him in prosperity or distress, and the hair of whose body stands erect with rapture on his simply hearing any of the appellations of KRISHNA articulated, has fulfilled every obligation, and merits the designation of a *Vaishnava*.

According to this *Purána*, and this only, the original cause of KRISHNA's incarnation, was his love of RÁDHÁ. The RÁDHÁ of the *Goloka* had been compelled to assume a mortal body, by the imprecation of a *Gopa* of that region, KRIDAMA, the minister of his master's pleasures, and the object of RÁDHÁ's anger. Him she condemned in a fit of jealous indignation to become the *Asura* SANKHÁCHU'RA, and he in retaliation sentenced her to become a nymph of *Vrindávan*. To console her in this condition KRISHNA also came down to this world,

as her lover; at the same time, however, granting the prayers of Brahmá and the gods, who solicited his appearance to relieve the earth from the burthen of the iniquities under which she laboured, the legitimate purpose of every descent or *Avatára*. In order to provide Krishna and Rádhá with suitable associates, all the gods and goddesses also assumed their respective characters as *Gopas* and *Gopis*, or members of the family of Yadu, and the heroes of the *Mahábhárat*. Vasudeva, the father of Krishna, was an incarnation of Kasyapa, and De'vaki, his mother, of Aditi. Nanda was an incarnation of one of the *Vasus*, and Yasodá of his spouse Dhará. Durgá was incarnate as the daughter of the bear Jámbaván. Jambavaiti one of Krishna's brides, and Lakshmi', multiplied herself into the sixteen thousand princesses, whom Krishna enumerated amongst his wives.

The story of Vasudeva and De'vaki, and the birth of Krishna are narrated in the usual manner, which gives occasion to directions for the celebration of the *Janmáshthami*, or festival in commemoration of the birth-day of Krishna on the 8th lunation of the month *Srávan*, and the *Purána* authorises its observance agreeably to the practice of the *Sáktas*, which allows it to be independent of the moon's entering into the asterism *Rohini*, although should the position of the moon and the lunation occur together, the festival is the more holy, and is termed *Jayanti* or triumphant. The festival is on no account to commence on that day, in which a part of the 7th lunation may occur. The variety of doctrine and observance on this head is explained in the Asiatic Researches (vol. xvi. page 92, note.) To omit the observance altogether is a crime not to be expiated, and is equal in atrocity to the murder of a hundred *brahmans*.

The infant exploits of Krishna are next related, and require no particular comment. Garga, the *Muni*, points out Rádhá, the daughter of Vrishabha'nu, as an eligible bride for the youth, and acquaints Nanda, Krishna's foster father, of the secret of her divinity, in which he thus expounds her name.

" The letter *R* preserves persons from sin, the vowel *A* obviates regeneration, *D'h* shortens the period of mortal existence, and the second long vowel sunders all worldly bonds." The marriage was accordingly celebrated with great rejoicing, and the distribution of viands in large quantities, and the donation of immense treasures. The incompatibility of such profusion, with the condition of Nanda, the cowherd, is of no consideration to the author of this work, although it

has saved the author of the *Bha'gavat*, the original of the greater part of the story, from any such gross extravagancies.

The hero of the festivities, steals the curds in the next chapter, for which he is tied to a tree, and gets a whipping from his foster mother YASODÁ. After she leaves him, the tree falls, and from it emerges NALAKUVERA, the son of KUVERA, condemned to this metamorphosis, for indecent behaviour in the presence of DEVALA* *Muni.*

A long chapter is next occupied with the praises of RA'DHA' by KRISHNA and BRAHMA', which inculcate her supremacy over all other divinities, male or female, and her being inseparable from and one with KRISHNA. The sports of the juvenile god are then related, and his destruction of the demons VAKA, KESI, and PRALAMBA; the construction of palaces at *Gokula*, for all its inhabitants, by VISWAKERMA', the divine architect, of whose architectural exploits, the village of *Gokula* now offers no vestiges. This part of the work comprises the history of VRISHABHÁNU, and his wife KALA'VATI, the parents of RÁDHÁ, and who were rewarded by her birth, for the virtues of their former existence, as SUCHANDRA, a king of the family of MENU, and KALA'VATI, a will-born daughter of the *Pitris* or progenitors of mankind. This story includes a dissertation upon the virtues of women.

Several chapters follow, partly describing the actions of KRISHNA, and partly expatiating upon his excellencies and those of RÁDHÁ.

A legend of SÁHASIKÁ, the son of the son of BALI, follows, who was turned into an ass, by the curse of DURVÁSAS, for having disturbed the meditation of that sage, in the prosecution of his amours with TILOTTAMÁ, a nymph of heaven. On the penitence of the couple, DURVÁSAS announced to them, that the ass should be destroyed by the discus of KRISHNA, in consequence of which, the spirit of SÁHASIKA should receive final emancipation, and that TILOTTAMÁ should be born the daughter of BÁNÁSURA, in which capacity, she should become the bride of ANIRUDDHA, the grandson of KRISHNA.

The marriage of DURVÁSAS with KADÁLI, the daughter of AURVA *Muni*, is the next legend; in this, the violent temper of his wife excites the sage's wrath, and he reduces her to ashes. Repenting subsequently of his anger, and soothed by the appearance of BRAHMÁ, he changes the remains of his wife into a plantain tree. The same sage is the subject of another legend of great celebrity amongst the *Vaishnavas*, as illustrating KRISHNA's superiority over SIVA. DURVÁSAS, a votary of that deity, being offended with AMBARI'SHA a devout worshipper of VISHNU, attempted to destroy him, but was repelled, and narrowly

* One place has Galava.

escaped destruction himself by the *Chakra* or discus of VISHNU, which came to the assistance of the king. The merits of fasting on the eleventh day of the fortnight, are the subject of the next chapter, and they are followed by an explanation of the eight names of DURGÁ, which again is relieved by a story of KRISHNA, carrying away and hiding the clothes of the nymphs of *Gokula*, whilst they were bathing in the *Jumna*. He gives up his booty upon being prayed to by RÁDHÁ, in the usual strain, eulogising his divine supremacy, and identification with all things known or unknown. Several legends of minor importance follow, to the 32nd chapter, when that, and the two following, are occupied with the advances made by MOHINI, a heavenly nymph to BRAHMÁ, and his insensibility, in resentment of which she curses him, that he shall not receive any adoration from mankind; the effects of which malediction are said to be evinced in the neglect which BRAHMÁ experienced from the professors of the *Hindú* faith.

The attention of the work is next directed, through a series of chapters, to the legends of the *Saiva* faith, or BRAHMÁ's discomfiture by SIVA, the asceticism of the latter, his marriage with SATI, the daughter of DAKSHA, her burning herself, and SIVA's second marriage with PÁRVATI the daughter of HIMÁLAYA. Stories of VRISHASPATI, INDRA, VÁHNI, DURVÁSAS, and DHANWANTARI then follow. All these legends are supposed to be narrated by KRISHNA to RÁDHÁ, for her entertainment; and their general purport is to shew, that the personages to whom they refer, are immeasurably inferior to KRISHNA, and his votaries.

Some cases are then recorded of the humiliation of the leading personages of the *Hindú* Pantheon, in consequence of their incurring the displeasure of KRISHNA or some of his followers. VISHNU, whilst boasting himself the god of all, was swallowed by KRISHNA in the form of a *Bhairava*, all but his head, and was restored to his form, on recovering his senses. BRAHMÁ, whilst making a similar vaunt, was surprised to behold multitudes of *Brahmás* and *Brahmándas*, or creations distinct from himself and his works; and SIVA was condemned to pay the penalty of his pride, by his marriage with SATI, and distraction for her loss, which were the delusions of KRISHNA.

The 62nd chapter contains a summary account of RÁMACHANDRA, and the next ten proceed with an account of the transactions that immediately preceded KRISHNA's departure from *Vrindávan* for *Mathurá*, whether he was attracted, with his supposed father NANDA, by a special invitation from KANSÁ, his uncle, with a view to his destruction, at a sacrifice offered to SIVA. The result of this visit is the death of KANSÁ, as described in other *Purânas;* but there is no detail of the

previous wrestling, which occurs in the *Bhágavat.* On taking final leave of his foster father NANDA, KRISHNA favours him with a code of regulations, for his moral and religious conduct: he is not to look at a single star, nor the setting sun or moon; not to keep company with the wicked, nor to injure or insult *Bráhmans*, cows, and *Vaishnavas;* not to delay payment of the due fees to the priest who officiates at a ceremony; not to eat flesh or fish; not to vilify SIVA, DURGÁ, or GANAPATI; and on no account to omit every possible demonstration of his love for HARI. These injunctions extend to a great length, and are all of as little importance as the above. There are some curious denunciations, however, against acts which are lawful in the institutes of MENU; and no distinction is here made between a *Bráhman* who follows the profession of arms, and one who marries a woman of the *Súdra* caste. There is also a singular leaning shown to the *Saiva* faith, and the man who forms a single *Siva-linga* of clay, is said to reside in heaven for 100 *Kalpas.* The following scale is given of KRISHNA'S affections: "Of all tribes the *Bráhman* is most esteemed by me, LAKSHMI' is still more beloved than a *Bráhman*, RÁDHÁ is dearer to me than LAKSHMI', a faithful worshipper is dearer than RÁDHÁ, and SANKARA is the best beloved of all." The instructions to NANDA comprise also a dissertation upon dreams, upon knowledge of the divine nature, and on the duties of the different castes and orders of the *Hindús*, on the duties of women, and the expiation of offences. This division of the work extends from the 75th to the 85th chapter.

A legend of the birth of VRINDÁ, the daughter of KEDÁRA, next follows: from her, *Vrindávan*, or as usually termed *Bindrában*, derives its appellation, she being identified with RÁDHÁ in her birth at that place. This chapter is followed by several others of a very miscellaneous character, in which BRAHMÁ, SIVA, and the *Munis* eulogise KRISHNA'S power. The next sections are occupied with the mission of UDDHAVA from KRISHNA to *Gokula*, to bear intelligence of the latter to his parents and his mistresses; and we have then a short detail of the usual *Pauranik* chronology: UDDHAVA returns to KRISHNA, and we have then a narrative of KRISHNA'S being invested with the thread of his tribe; he then prosecutes his studies under SANDI'PANI *Muni*, and at their close relinquishes the garb of a cowherd for the robes of a king, presenting to his *Guru* four lacs of diamonds, an equal number of other sorts of gems, five lacs of pearls, a necklace worn by DURGÁ, dresses worth all the treasures of the world, and ten crores of *Suvarnás*, or certain measures of gold:—puerile exaggerations, which although not

unknown to the other *Puránas*, are most lavishly multiplied in the work under review.

Although assuming a royal character, this work describes KRISHNA as resigning the supremacy to UGRASE'NA, and directing *Dwáraká* to be built for him, by the divine architect VISWASE'NA—a wide departure from the account every where else given of the circumstances, under which *Dwáraká* became the capital of KRISHNA. He having been driven from *Mathurá* by JARÁSANDHA, the father-in-law of KANSA, whom KRISHNA had deposed and slain; KRISHNA and his tribe, on their expulsion from *Mathurá*, fled to the west coast of the peninsula, and there founded a new city. No notice whatever is taken of these revolutions in this work, although they are told at some length, in the *Mahábhárat*, *Vishnu Purána*, and *Bhágavat*. In a subsequent chapter indeed, this *Purána* refers to the same events, although it does not particularise them; and RUKMI the brother of RUKMINI' reproaches KRISHNA with having fled to *Dwáraká* through fear of JARÁSANDHA.

KRISHNA's marriage with RUKMINI' is next narrated, but he does not carry her off, as in other authorities. Her brother opposes his entrance into the city, but is defeated by BALADEVA, and then KRISHNA enters, and is duly married to the princess in her father's presence. Every where else, he runs away with her before the marriage, and BALADEVA checks the pursuit.

In the next chapters, a conversation between RÁDHÁ and YASODÁ, expounds the purport of eleven names of KRISHNA, and these are succeeded by an account of the birth of RUKMINI''s son PRADYUMNA, his being carried off by a demon, and his recovery, the birth of other sons of KRISHNA, and marriage of the sage DURVÁSAS to a daughter of UGRASE'NA. KRISHNA's share in the war of the *Mahábhárat* is very briefly dispatched, except a long hymn to him by SISUPÁLA, whom he slew. The intrigue of ANIRUDDHA, KRISHNA's grandson, with USHÁ, the daughter of VÁNA, is narrated at some length, in the usual style, and the unsuccessful contest waged by that prince against KRISHNA is protracted by the episodical insertion of a variety of stale legends, to a disproportionate extent; these stories are related alternately by ANIRUDDHA and VÁNA, as they stand prepared to engage in single combat for the purpose of proclaiming the respective might of KRISHNA and SIVA, VÁNA being devoted to the worship of the latter divinity. SIVA however, after vainly attempting to dissuade him from the conflict, is obliged to witness his votary's defeat, with that of SKANDA

and BHADRAKÁLI, who had gone to his succour; and VÁNA becoming sensible of KRISHNA's supremacy, consents to his daughter's union with ANIRUDDHA.

The next chapters relate to the origin of the *Bindusára Tirtha*, from the tears of KRISHNA; the reason why it is sinful to look at the moon on the 4th day of *Bhádra*, and SATRAJIT's obtaining that gem, whose presence in a country insures its fertility. The adoration of GANE'SA by RÁDHÁ, in the presence of the assembled deities, is the subject of the 122nd and 123rd chapters, and as acknowledged in the text, is one rarely treated of in other *Puránas*. GANE'SA, not to be outdone, eulogises RÁDHÁ in his turn, and is followed by BRAHMÁ and ANANTA. The worship of GANE'SA by RÁDHÁ marked the termination of the curse, which had sentenced her to a mortal existence; and she was then restored to her celestial nature, in which DURGÁ is made to declare that there is no difference between RÁDHÁ and herself, and whoever speaks in a depreciating manner of either, is equally punished in hell.

KRISHNA, having also offered worship to GANE'SA, returns to *Dwáraká*, and resumes his lessons to NANDA and his family; he also prophesies the depravity of the world in the succeeding or *Kali* age, in which men will abstain from venerating *Sálagrám* stones and *Tulasi* plants, and attach themselves assiduously to the service of *Mlechhas*, barbarians and outcastes, who it is said also, shall become the rulers of the country:—expressions indicative of the prevalence of the *Mohammedan* authority, when the *Purána* was compiled.

RÁDHÁ after this returns to *Goloka*, with all the *Gopas* and *Gopís* of divine origin, KRISHNA creating others to supply their place at *Vrindávan*. The circumstances of KRISHNA's death, by a wound from a hunter, the destruction of his tribe, and the submersion of *Dwáraká* by the sea, are next alluded to, in so brief and obscure a manner, that without a previous knowledge of what is intended the notice would be quite unintelligible; and these events are lost sight of amidst the much more detailed addresses of the gods and goddesses, the ocean, the rivers, and particularly the Ganges, in which the sufferings of the earth, in consequence of KRISHNA's departure, are most pathetically lamented. After KRISHNA's death, the form that proceeded from his person, went to the *Sweta Dwípa*, where it became two: one-half was NÁRÁYANA, the lord of *Vaikuntha;* the other was KRISHNA, the deity of *Goloka*, the supreme indescribable source of all, who ascended to his original seat, and was reunited to RÁDHÁ.

The *Puráṇa* properly closes here, at the end of the 128th chapter; but NÁREDA, who has been its auditor, now hears from the narrator NÁRÁYANA, that he, NÁREDA, was in his former life, a *Gandharva*, the husband of 50 wives, one of whom is reborn, as well as himself, and by the boon of SIVA, is to be once more his bride. NÁREDA submits rather reluctantly, and shortly after his marriage with the daughter of SRINJAYA, who is declared to be one with MÁYÁ, run away from his wife to perform penance, through which he is united with HARI.

A supplementary chapter, the 130th, follows, in which SU'TA, the ordinary narrator or recapitulator of the *Puránas*, relates two legends, explaining the birth of Fire from BRAHMÁ, and of gold from Fire. Chapter 131 is a short index to the *Puránas*. The last chapter, 132, enumerates the different *Paráṇas* and *Upapuráṇas*, the five works called *Pancharátra*, and the five *Sanhitás* or compendia of the *Vaishnava* faith. It is also remarkable for its definition of the *Mahábhárat*, and the *Rámáyana*, the former of which it terms a *Itihása*, or history, and the latter a *Kávya*, or poem: the work terminates with a eulogium on itself; the attentively hearing of one quarter of a verse of which, is equal in merit to the gift of the heaven of KRISHNA.

The preceding sketch of the contents and character of this work will probably have furnished sufficient evidence of its modern origin. It is clearly subsequent to the great body of *Hindú* literature, not only by the enumeration just noticed, but by reference to the several philosophical systems, the *Terka*, *Vaisheshika*, *Sánkhya*, *Pátanjala*, *Memánsa*, and *Vedánta*, which occurs in a preceding passage. Its being the latest of the *Puránas* is also apparent from its own avowal of its being intended to clear up the discrepancies observable in those works, and by the frequent assertion, that the legends it gives, particularly those respecting GANE'SA, are not to be met with in the other *Puránas*. That it was compiled subsequent to the *Mohammedan* invasion, is very probable, from the allusions it contains to the supremacy of *Mlechha* rulers; and the particular branch of the *Hindú* system which it advocates, renders it likely to have emanated from a sect, which there is reason to imagine originated about four centuries ago with VALLABHÁCHÁRYA and the *Gosains* of *Gokula*.

II.—*Some observations on the Quantity of Earthy Matter brought down by the Ganges River. By the Rev.* R. Everest.

[Read before the Physical Class, 13th June, 1832.]

In the course of last summer, I made some attempts to ascertain the weight of solid matter contained in a given quantity of Ganges water, both in the dry and rainy season, but I found the weight so variable on different days (when little difference might have been expected) that I can hardly consider the observations numerous enough to give a correct average. Such as they are, however, they may not be without interest in the absence of other information on the subject. I therefore take the liberty of laying them before the Society, and shall, if opportunity offers, endeavour to add some further data, both for the weight of solid matter, and also for the rise and velocity of the river.

1. A quantity of Ganges' water taken 27th May, 1831, gave when evaporated, a solid residuum of 1.084 grains per wine quart.

2. July 21st. There had been little rain for some days, and the river was low for the season: a wine quart contained of soluble matter 2.0 grains; of insoluble, 16.2;—total 18.2.

3. August 2nd. The river being much higher, the same quantity of water gave insoluble matter 28.7, soluble 3. 0;—total 31.7.

4. August. 13th. The river had reached its maximum, and gave from the same quantity of water, insoluble matter 73.5 grains; soluble 2.7;—total 76.2.

5. August 20th. The water had hitherto been taken from the side, but as it was evident that the quantity of matter held in suspension in the middle of the current was much greater than towards the bank, where the water was nearly still, I took two separate portions as before, and obtained, from the middle, 40 grs. of insoluble residuum; from the side 20 grains ditto: add for soluble matter, suppose two grains to each, the middle gives 42, the side 22 grs. The river to-day was at the same height as on the 13th.

6. Sept. 7th. Two portions taken this day, as before, gave for the middle 19, the side 15.

7. Sept. 21st. The middle gave 22, the side 20.

The different proportion in this case was occasioned by a strong east wind agitating the water near the shore.

8. Oct. 4th. The middle gave 9.6, the side 5.1.

The numbers therefore stand thus:

	Middle.	Side.
20th August,....	42	22
7th Sept.....	19	15
21st, ...	22	20
4th Oct.....	9.6	5.1
Average	23.1	15.5

These numbers are to each other nearly as 3 to 2, so that we may correct the previous observations as follows:

21st July.....	27.3
2nd August....	47.5
13th——.....	114.3

The first rain fell on the afternoon of the 14th June, and we have unfortunately no observation for the first month of their duration, but I think 27.3, the quantity on the 21st July, would be rather a low than a high average for it. For the second month, viz. from the 15th July to the 15th August, we have three observations, which give an average of 63 grs. For the third month, we have two, with an average of 30.5 grs. For the fourth month we have two, giving an average of 15.8. So that the average for the whole period, from the 15th June to the 15th October, would be 34 grs. On the 15th March, 1832, a quantity of water taken in the middle of the stream gave 6 grains per quart: a mean between this and 9.6 (the weight obtained on the 4th October), or 7.8 grs., may be taken as the average from the 15th October to the 15th March, or for five months.

1.084 per quart was the weight obtained on the 27th May, from water taken at the side. If we correct this as before, it gives 1.63, and the mean between this and 6, or 3.8 will be the average for the remaining three months, from the 15th March to the 15th June.

I will here add such data as I possess respecting the breadth, depth, and velocity of the stream.

I found the breadth on the 15th March 1832, to be 660 yards. The distance up the bank to the maximum height of the rains was 158 yards more on the southern shore, and 38 yards on the northern; which reduced to a level, would give a total breadth of 2563 feet, for the maximum breadth of the rains; 1980 feet, being the least breadth in the dry weather.

On the same day, the total perpendicular fall from the maximum height of the rains was 28 feet. The whole breadth of 1980 feet, sounded at intervals of 300 feet, gave an average of 17 feet 8 inches, which added to 28, gives 45 feet 8 inches for the maximum depth in the

rains. The river had reached this maximum on the 13th August, and continued at the same until the 20th. After that it subsided as follows:

	ft.	in.
On the 26th August the fall was	7	6
7th Sept.	5	2
21st Sept.	5	6
27th Sept.	13	0
4th Oct.	15	4
25th Oct.	22	10

So that we may call the average depth for the third month of the rains 4 feet 3 inches below maximum, or in round numbers 41 feet. For the fourth month, viz. from the 15th Sept. to 15th Oct. the average depth would be 11 feet 3 inches below maximum, or 34 feet. For the first two months of the rains, the rise of the river was not measured, but from the quantity of rain that fell and the apparent increase, I cannot believe that the average depth would be less than the average for the fourth month, viz. 34 feet. If then we assume this number for the first two months, we have an average depth of 36 feet for the four months of the rains. A mean between 22 feet 10 inches (the fall measured on the 25th Oct.), and 28 feet (the fall measured on the 15th March), gives 24 feet 11 inches for the fall below the maximum in the intervening period, or in round numbers 20 feet for the actual depth during that period. For the three months of dry weather ensuing, 17 feet 8 inches may be taken as the depth.—We have seen that the least breadth in the dry weather was 1980 feet, and the greatest in the rains 2563 feet; leaving a difference of 583 feet. So that while the depth diminished 28 feet, the breadth diminished 583 feet, or 21 feet of breadth nearly for one of level. This proportion gives us 2383 feet for the average breadth during the four rainy months. Owing to the diminished velocity near the bank, and the diminished quantity of matter held in suspension there, this excess must be again reduced. Probably 2080 feet may be reckoned as the fair average breadth for the rainy months, 1780 for the winter, and 1730 for the hot months. The velocity, by the mean of two measurements on the 2nd and 14th April, 1832, at the surface, was 4425 feet per hour. I have no similar measurement for the maximum velocity in the rains, but while the river was at its greatest height I came a computed distance of 10 miles in an hour and a half, and from other observations of the same kind, both by myself and others, I am induced to estimate the maximum velocity at $6\frac{1}{2}$ miles, or 34320 feet per hour. Assuming that the

velocity varies as the depth, we have 23,800 feet for the average velocity during the rains, 7435 feet for the winter, and 4425 feet for the hot months. I make no allowance for the decreased velocity of the stream near the bottom, because it is in all probability compensated by the increased weight of matter held in suspension there ; for the decreased velocity at the sides I have allowed by reducing the breadth. Our whole data therefore stands thus :

Season.	Depth. ft. in.	Average breadth as reduced.	Velocity. ft. per hour.	Cubic feet discharged per second.
Rains, 4 months,..	36	2080	23800	494,208
Winter, 5 months, ...	20	1780	7435	71,200
Hot weather, 3 months,..	176	1730	4445	36,330

34 grains per wine quart was found to be the average for the rains. Now as a wine quart of water weighs 14544 grains, we have about $\frac{1}{4}\frac{1}{2}\frac{1}{3}$th part of solid matter by weight. But as the specific gravity of this cannot be stated at less than 2, we have $\frac{1}{8}\frac{1}{5}\frac{1}{6}$th part in bulk for the solid matter discharged, or 577 cubic feet per second. This gives a total of 6,082,041,600 cubic feet for the discharge in the 122 days of the rains :—7.8 grains per wine quart was the weight determined for the five winter months or $\frac{1}{1}\frac{1}{8}\frac{1}{3}\frac{1}{8}$th part in weight, and $\frac{1}{3}\frac{1}{6}\frac{1}{7}\frac{1}{6}$th part in bulk, which gives 19 cubic feet per second, or a total of 247,881,600 cubic feet for the whole 151 days of that period :—3.8 grains per wine quart was the weight allowed for the three hot months, which gives a $\frac{1}{3}\frac{1}{8}\frac{1}{2}\frac{1}{7}$th part by weight, and a $\frac{1}{7}\frac{1}{6}\frac{1}{3}\frac{1}{4}$th part by bulk, or about 4.8 cubic feet per second for the discharge of solid matter, and a total of 38,154,240 cubic feet for the discharge during the 92 days. The total annual discharge then would be 6,368,077,440 cubic feet.

In comparing these observations with some previous ones, I was glad to find that my average for the rains of $\frac{1}{8}\frac{1}{5}\frac{1}{6}$th part in bulk is nearly the same as that obtained by Captain Forbes, viz. 2 cubic inches in 1728, or 1 cubic foot.

I have stated the discharge for the hot months at 36,330 c. f. It is stated in the Gleanings at 20,000 at Benares. On looking over the data from which the estimates are drawn, I see that the product of the breadth and depth there given is greater than my own, the two products being to each other nearly as 5 to 8, but that the velocity I have found is to what is there given, nearly as 15 to 5. My measurements were made with care, and as I have been unable to detect any mistake in them, I have given the result of them in the hope that some one may be induced either to verify or contradict them. Again, there is a great difference between the discharge there estimated for the rains and my own results.

The former amounts to 1,372,500, or nearly three times mine, which is only 494,208. Had I made the estimate for three months of rain instead of four, my average of course would have been larger. There is too another reason why my estimate may be considered as lower than the truth. There is in the rains a small back stream, which forms an island of the opposite shore here. I examined this in the rains, but found the velocity of it so trifling, that I was induced to pass it over. Neither of these causes could raise mine to within one half of the Benares estimate.

III. *Note on the Magic Mirrors of Japan.* *By* James Prinsep, *Sec. Ph. Cl. As. Soc.*

[Read before the Physical Class, 13th June.]

The Japanese have long been celebrated for the manufactory of metallic mirrors, in which they carry on a considerable trade with China. They are ornamented with different devices on the back, and are well polished on the reflecting surface; but what constitutes their chief interest among Europeans is an adventitious property possessed by them, which must have originally been discovered by chance, although it is not certain at what period it became known, or whether the manufacturers, once apprized of the secret, have purposely cultivated its principle in the fabrication of their mirrors to give them an additional value in the market: the fact is known in China and among the English, but I believe no explanation has hitherto been suggested.

One of these mirrors was lately brought to Calcutta, and most of those whom I have the honor to address have had an opportunity of witnessing its effects; I have therefore the less cause to regret that its transmission to England has prevented my exhibiting it this evening. It has been sent home to a gentleman with whom its mysterious qualities will soon cease to be an enigma, if indeed they excite a moment's curiosity in his mind; but we have been surely a little hasty in allowing it to go from among ourselves, before we have attempted an explanation of the phenomenon it exhibited, as though we feared to hazard the investigation of so very simple a problem in optics, or have failed to discover its solution. To avert a suspicion of so derogatory a nature either to our zeal or to our optical acumen, I beg leave to offer the following explanation of the phenomenon to the consideration of the Society:

The Japanese mirror is a slightly convex disc of bell-metal, about six inches in diameter, and a quarter of an inch in thickness on the edge, ground and polished on the convex face, and covered with a

thin coating of silver to give it a white colour. The back of the mirror is deeply carved or indented with ornamental work in circles and festoons, and it bears an inscription in the Japanese character in high relief upon what may be termed the tympanum of the disc : in the centre there is a projecting knob perforated laterally to receive a string for suspending the mirror : the metal is highly sonorous when struck as a bell, and is so soft as easily to be indented or scratched on contact with any hard substance. I found its composition to be

Copper..	80
Tin.....	20
	100

with no traces of silver or arsenic, and a very slight indication of zinc. When a strong ray of light, as from the sun, is reflected from the polished surface of the mirror upon a screen, instead of a clear bright disc, as would naturally be expected, the spectrum is found to exhibit a tolerably clear delineation of the ornamental pattern on the back of the mirror: the outer circles; the festooned ring ; the magical inscription, are all seen depicted with fidelity ; and it certainly does stagger an observer for the first time to witness an image shadowed forth, without any visible origin ; for the back of the mirror may be covered or concealed in any way without diminishing the effect.

No irregularity of surface was perceptible on the face of the mirror. It had been scratched in one or two places, and I put it into the hands of a silversmith to be repolished : in effecting this he rubbed off the plating in several places, and exposed the surface of the bell-metal : this, although in some respects a blemish, was one step in a *negative* investigation of the cause of the phenomenon, for the reflected image continued just as marked as before, merely being of a red colour where the silvering was removed ; thus showing that the cause was unconnected with the nature of the reflecting surface.

As it was seen that the thick parts, the rim, the festoon, and the letters, were those which appeared most illuminated in the spectrum, an obvious explanation occurred, that the light was more perfectly reflected from thick surfaces than from thin ones, however such an assertion might militate against the known laws of metallic reflection, which all experiments have proved to be purely superficial or confined to an infinitely small depth below the surface : this hypothesis was easily put to the test of experiment, by casting some specula of very unequal thickness, and then grinding and polishing the upper surface : but when the mirrors were thus made, the image reflected from them was found to

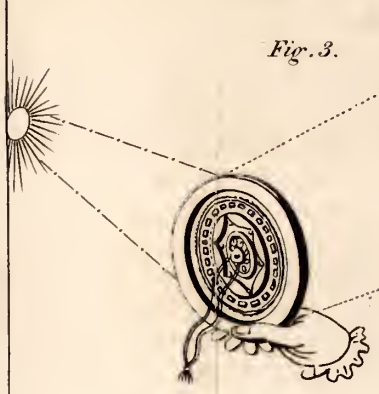
be altogether smooth and natural, and the first supposition of course was no longer tenable. It then occurred, that the various parts of the Japan mirror might be of different *density*, supposing the pattern to be made by stamping, and that either the rays of light might be more forcibly repelled by the denser metal than by the lighter, or that parts of the surface would acquire different degrees of polish, sufficient to cause the illusion, although imperceptible to the eye. But in such case the thin parts, from being the hardest, should give the stronger reflection. This supposition was also overthrown by experiment. A disc of silver having been annealed at a red heat, so as to be quite soft, was stamped on the back with a circular ring, deeply indented, so as to harden the silver in that part only. The opposite surface was then ground and polished, when it was found to give a clear and uniformly reflected spectrum.

The third and, I believe, the true explanation was suggested by the well known phenomenon of the reflection from a brass button, which every school boy has remarked when sporting his Sunday "blue coat with metal buttons" in the sunshine of his tutor's parlour window. The button throws a radiated irregular image on the wall, exhibiting two bright concentric circles, one on the edge, and another about one third within it: and there is generally a bright spot in the centre; all of which seems but the picture of the stamp on the back of the button: the radii resemble, and indeed coincide with the letters of "superfine' or gilt" inscribed within a double circle, and the central spot represents the shank: there can be little doubt, that the principle is in this case precisely that of the Japan mirror, and on cursory view, the surface appears equally smooth and unsuspicious. On minute examination, however, of several buttons, I found them to be by no means plane; their general surface is slightly convex; there is a hollow in the centre, and a projection in the position of the inscription behind, caused no doubt by the blow necessary in stamping it—the polish is probably given by a rotatory motion, and consequently does not remove these very small irregularities. To follow up the experimental investigation, I selected one of the buttons, which gave a good image; ground it on a flat hone, and polished it: all of the magical figures vanished in a moment, and a plain bright disc appeared in their stead! Here then may be a key to the mystery of the mirror: the deception is entirely produced by irregularities on the surface, which are rendered the less perceptible to the eye, because the surface is convex instead of being plane.

But it may be objected, that the two circles which appear bright in the reflected spectrum of the button, represent the *indented* or thin parts

Japanese Mirror

Fig. 3.



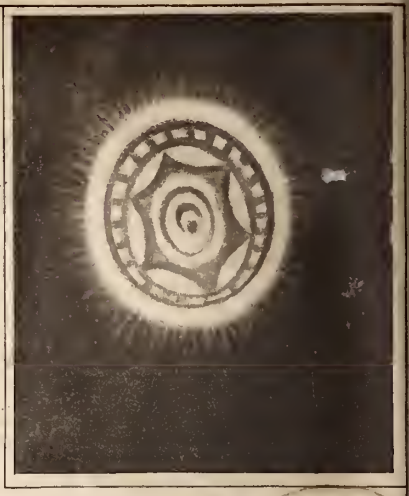


Fig. 1.

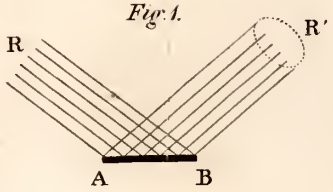
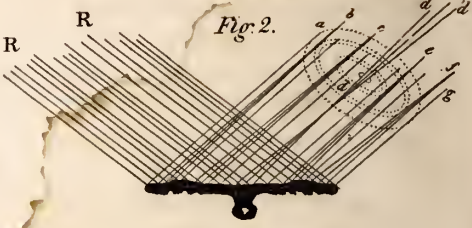


Fig. 2.

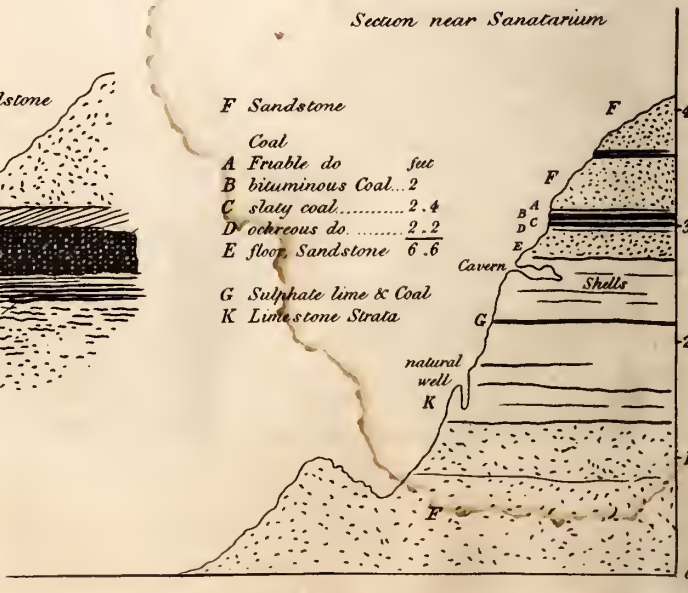


Chirra Púnjí Coal Strata.

Fig. 4.

Fig. 5.

Section near Sanatarium



of the metal, whereas the *thick* parts of the Japan mirror are those which appear illuminated. A short analysis of the facts in either case will readily explain to what these discrepancies are attributable, but it will be necessary to have recourse to a diagram.

Let A B Pl. VI. *fig.* 1, be a plane mirror, upon which the rays of light R impinge : they will be reflected uniformly in R′ forming a clear image. Now let A B C D E F G be another reflecting surface, having two convexities, B C, E F; and one concavity in the centre, D ; (the conditions nearly of the brass button.) In this case the light R R reflected from the outer concave flexures of the protruding portions of the surfaces B C, E F, will converge in the foci *b*, *c*, and *e*, *f*, respectively, at distances corresponding to the radius of their curvature : the effect will of course be visible within wide limits of the actual focus. In most of the buttons however the central depression is so great, that it collects the rays in a focus *d*, a few inches only in front of the surface ; and when the spectrum is thrown farther off, the rays, crossing, form two less distinct luminous foci at *d′ d′*.

It follows from analogy that the thin parts, or tympanum, of the Japanese mirror, are slightly convex with reference to the rest of the reflecting surface, which may have been caused either by the ornamental work having been stamped, or partially carved with the hammer and chisel on its back ; or, which is more probable, that part of the metal was by this stamping rendered in a degree harder than the rest, so that in polishing it was not worn away to the same extent. That the curvature is extremely small, is proved by the circumstance of the image being nearly equally well defined at the distance of two or twenty feet, or within all the limits at which I had an opportunity of trying it.

Advantage might be taken of this exceedingly simple principle, to produce a multitude of curious effects ; and I have little doubt that, in the skilful hands of an English artist, it will be converted into a philosophical toy, as amusing as the optical paradox, or even the far-famed kaleidoscope itself.

IV.—*Description of the Native Manufacture of Steel in Southern India.*

[Extracted from the manuscript journals of the late Dr. Voysey.]

Kona samundram, (corner of the sea,) situated about 12 miles south of the Godaveri, and 25 from Nirmul, is celebrated for its manufacture of steel, the chief part of which goes to Persia ; the following are the chief details of this manufacture, collected by repeated visits to the place, and personal inspection of the process.

The furnace is a temporary circular structure of clay, from four to five feet in height, and five feet in diameter. It is sunk two feet below the surface of the ground. The fuel is charcoal, and the fire is kept up by a blast from four bullock skins, placed at right angles to each other: the muzzles resting on the upper edge of the furnace, so as to force the blast downwards. The granitic clay of the furnace is highly infusible; it is found in the neighbourhood, and is formed of the decomposition of granite rock with small pieces of quartz and felspar, and is so valued for its refractory qualities, that it is exported for the manufacture of crucibles, &c. After some days, however, if a considerable heat has been maintained, the furnace becomes semi-vitrified, and requires renewal; the cost of a furnace is from two to three rupees.

The bellows are plied incessantly day and night: during the operation, the men are relieved every four hours, each being engaged to work 12 out of the 24. They are partly protected by a screen of mud placed between them and the furnace, but the heat and exertion render their task sufficiently laborious.

The iron is converted into steel in pine-shaped crucibles, made of the same clay as the furnace, and of various sizes, according to the purpose for which the steel is to be applied, whether for the fabrication of swords, or knives, or other articles.

In making the crucibles, the granitic clay above described is ground to a fine powder along with the fragments of old furnaces and crucibles, and the whole kneaded together with the chaff of rice and oil. The vessels are defended by a luting of the same, they are covered with a similar top, but a perforation is made in the latter. No charcoal is put into the crucible, but small pieces of *kanch*, or the glass formed in the process, are put at the bottom of them along with the ore, and serve of course as a flux. The crucibles are arranged and steadied in the furnace occasionally by the superintendent, with a long and stout rod of iron.

The materials used in the preparation of the steel are two different kinds of iron; one from *Mirtpalli*—the other from *Kondapur*, in the proportion of three parts of the former to two of the latter. The *Mirtpalli* iron is derived originally from the iron sand already noticed, and is sent in the state of large amorphous masses of a reddish grey color, and of an extremely porous texture. The internal fracture is often iridescent. The *Kondapur* iron is procured from an ore found amongst the iron clay, at a place about 20 miles distant. It is said to be of a dirty brown colour, and very frangible. The iron

however, is moderately compact and of a brilliant white fracture. Occasionally it contains some ingredient which spoils the steel, rendering it excessively brittle: the natives assert that the adulteration is copper, but it is more probably arsenic. The mixture being put into the crucible, the fire is excited and kept up for 24 hours. It is then allowed to subside, and the crucible is taken out and placed on the ground to cool. When quite cold it is opened, and a cake of steel of great hardness is found, weighing on an average about a pound and a half. The cake is covered with clay, and annealed in the furnace for 12 or 16 hours. It is then taken out and cooled, and again annealed, and this may be repeated a third or fourth time until the metal is rendered sufficiently soft to be worked. The steel is known by the name of *Wootz* in Telinga, and a *Kurs*, a cake of about 110 rupees weight, is sold on the spot for 8 annas. The daily produce of a furnace is about 50 seers, or in value 37 rupees. The cost of this steel is much enhanced by the exaction of the *jaghirdar*, who not unfrequently appropriates the advance to himself, and leaves the purchaser still to incur the whole expence.

The export, however, of the metal to Persia must be profitable, as it is sufficient to bring dealers from that country and to defray the cost and risk of travelling. We found at the village, in 1820, Hájí Hosyn, from Ispahán, engaged in the speculation; and it must have answered his purpose, as he was here again in 1823, having returned in the interval to Persia and disposed of the venture. He informed us that the place and the process are both familiar to the Persians, and that they have attempted to imitate the latter without success. Besides residing at the village, whilst making his purchases, he bore a personal part in the operation, weighing the proportions of the iron, and testing the toughness of the steel himself.

The following experiments may convey some notion of the degree of heat to which these furnaces can be raised, and which may be reckoned at 130° of Wedgwood. 25 rupees weight of steel, which had not been submitted to the last operation, with $\frac{1}{164}$th of a silver rupee, was fused in three hours into a button of hard steel. A piece of shelly stratum from *Jhirpa* fused into a sort of porcelain. A piece of hornblende schist was fused into a glass, with many globules of iron and manganese floating on the surface. The granite from the bed of the *Godaveri* yielded a green glass. *Belkonda* granite was partly run into a green glass with pieces of quartz little altered, floating on the mass. *Sitabaldí* basalt was melted into a yellowish green, and *Jhirpa* wacken into a very perfect opaque black glass.

V.—*Proceedings of Societies.*

1.—ASIATIC SOCIETY—Physical Class.

Wednesday, 13th June, 1831.

James Calder, Esq. in the chair.

The chairman communicated the offer of Dr. H. H. Spry of Sagar, to correspond with the Physical Class, on Geological subjects, which was accepted with thanks.

Correspondence.

1. The following letter was read from Mr. J. D. C. Sowerby, acknowledging the receipt of the Himalayan Fossil Shells sent to him for examination, at the suggestion of the Rev. R. Everest, in 1831.

To James Prinsep, Esq. Sec. Ph. Cl. As. Soc.

SIR,

I feel highly honoured by the resolution of the Physical Class of the Asiatic Society, forwarded to me in your letter, dated the 26th of January, and request you to present my thanks to the Society for the series of specimens which I have lately received.

I had before seen some specimens from the same mountains, in the possession of Mr. Stokes and Dr. Buckland, among which were several ammonites that are as yet unnamed. The Rev. Mr. Everest's deductions are correct, as far as they relate to the formations the fossils belong to, as you will see by the accompanying list of names, to each of which I have added the formation in which that species occurs, in England.

In the genus *Terebratula*, there are many species that cannot be depended upon as indicating particular formations, because very similar ones are found in several beds, and the species are difficult to determine, especially if not quite perfect. You speak of a *Pecten*, which Mr. Everest thinks does not differ from the common Scallop, it is very probably *P. æquivalvis*, which is characteristic of the inferior Oolite; both of its valves bear a strong resemblance to the convex valve of *Pecten maximus*. The *Helix* you speak of may possibly be *Ampullaria nobilis*, which accompanies the *Cirrus* in the lower beds of the mountain limestone of England and Ireland.

Allow me to repeat, that I am sensible of the honour conferred upon me by the Asiatic Society, and shall always take a pleasure in replying to similar communications, or in being in any way serviceable to science.

I remain,

Dear Sir,

Your faithful servant,

J. D. C. SOWERBY.

5, *Camden Terrace*, *West Camden Town*, *London*, *Oct.* 14, 1831.

List of Fossil Shells from the Himalaya.

Fig. 1. (See GLEANINGS III. Plate XVII.) *Avicula* (rather than *Pecten*), species new.

2. *Spirifer striatus*, [Min. Con. tab. cclxx.] Mountain Limestone.

? Cast of the interior of *Spirifer striatus*, Mountain Lime.

3. *Producta scabricula*, [Min. Con. t. lxix. fig. 1.]

————, new species.

These two and the *Spirifer striatus* are in a stone strongly resembling some of the Transition Slate of Englaud, which contains similar shells.

4. *Astarte planata*, var. [Min. Con. tab. cclvii.] Inferior Oolite.

A variety of this shell is found at Bayeux in Normandy, and is called *Crassina modiolaris*. Also an unnamed large bivalve.

5. *Nucula*, an unnamed species ; similar fossils occur in the Mountain Lime and Lias.

7. Strongly resembles a portion of some large *Inoceramus*, but it is not perfect enough to determine.

12, 13. *Ammonites annulatus Anguinus*, of Schlotheim, Zeiten, Versteinerungen Wiirttembergs, t. ix. f. 2. Min. Con. tab. ccxxii. fig. 5, is the same shell. Lias formation. The large specimen is filled with sulphate of barytes, not carbonate of lime.

No. 24. *Belemnites sulcatus*, Sillot, Miller, Trans. Geol. Soc. 2nd series, vol. II. pt. 1, pl. 8, fig. 3, 4, and 5. *Bel. apiciconus*, Blainville's Memoire. Lias, inferior Oolite.

23. *Alveolus* of a Belemnite, perhaps of *B. sulcatus*. *Orthocera conica* of Min. Con. tab. lx. although called an *orthocera*, is only an *alveolus* similar to this.

2. The following letter from Dr. Falconer, Superintendent of the Hon. Company's Botanic Garden at Seharanpúr, was read.

Dehra Dún Fossil Remains.

To the Editor of the Journal of the Asiatic Society.

Sir,

In No. 3 of the Journal of the Asiatic Society, p. 97, Mr. Royle has announced the discovery by me of the fossil bones in the range of hills which skirts the Valley of Dehra on the south-west. I regret that Mr. Royle did not confine himself to a simple announcement of the fact, without giving an extract from the letter in which it is mentioned. The communication was made immediately after I had met with the fossils, and was an unguarded expression to an intimate friend, of what I imagined them to be, and not an opinion intended for a public Journal in the *ipsissima verba* of the letter. Beyond, therefore, the fact of fossil bones occurring in these hills, I do not wish to stand responsible for any opinion regarding their specific determination, in the present imperfect state of the inquiry. As yet they have been found in a small quantity only, and consist of a few fragmented portions of bones. The Lignite occurs in great abundance. The "fragmeuts of the shells" (not the *skull* as stated in the Journal) of Tortoises resemble those found by Mr. Crawford and Dr. Wallich on the banks of the Irawadi, and others contained in the museum of the Asiatic Society. The "fragment of a bivalve shell" is very imperfect, aud therefore very questionable.

I conceive it necessary to state that Lieut. Cautley, Superintendent of the Doab Canal, is the original discoverer of fossils in these hills. The most perfect portion I have yet seen of these fossil bones, has been in his possession several years, without however, his being aware of its nature.

H. FALCONER.

Seharanpúr, May 28.

Museum.

3. Specimens of the coal strata lately discovered at Sanárím, and near the Sanatarium in the Kasya Hills, were presented by the President in the name of Mr. W. Cracroft, with explanatory extracts from his letters.

The quality of the best specimens or middle stratum of this coal differs considerably from that of the Burdwan coal: it contains very little earthy matter; it burns with much flame, but does not form coke; spec. grav. 1.330, colour brown black: composition,

Volatile matter (of which aqueous, 7.5).....	45
Carbon, ...	53
Earthy residue, ...	3
	100

4. Specimens of iron ore (red clay iron), from Sambhalpúr, presented by Capt. Jenkins, on the part of Mr. Babington: also a box of Himalayan minerals, found at the Adjt. Gen.'s office, by Capt. Jenkins.

5. The following specimens of the iron ores of the Salem Hills, Southern India, and of the iron and steel in the various stages of its manufacture, according to the native processes, by Mr. Heath, M. C. S.

I. Magnetic Iron ore from Salem, in its natural state, mixed with quartz.

II. The same ore cleaned by stamping and separating the quartz.

III. The same ore crystallized in octohedrons. This state of the mineral is rather rare.

IV. Some specimens of cast steel made from this ore by the native process, together with the crucibles in which the steel is melted. Some of these are left open to shew the manner of charging them; others are stopped up ready to be put into the furnace.

V. Some specimens of chromate of iron from a mine lately discovered, and of Bichromate of Potash made from it.

Papers communicated.

6. Observations on the quantity of earthy matter brought down in the river Ganges, by the Rev. R. Everest.

[Printed in the present number, page 238.]

7. Report on the progress of the boring experiment, by Dr. Strong.

Since the last report considerable delays have taken place by the sickness of the superintendent. The boring No. 1, near the church in the fort was found so much injured by the searching after and extraction of the 100 feet of broken rods, that further operation in that quarter was abandoned after tubing the hole to the depth of 100 feet, and building over it a pump. There the depth obtained was 175 feet, and the water, which is sweet tasted, but muddy and ferruginous from the tubes, continues to stand at a level of 7 feet from the surface of the ground.

A second operation was commenced not long ago on the south end of the glass plot behind the Government house in the fort. Here the conductors of the experiment have adopted the use of a borer double the former size, and have in consequence easily forced down a strong sheet iron tube seven inches in diameter to the depth of 70 feet. Thence with a 6-inch auger

the perforation has been carried down to the depth of 130 feet, without much difficulty, and a 6-inch tube has been already sunk into it to a depth of 117 feet. Thus far the progress has been very satisfactory, and with the assurance of an iron shaft through the two strata of sand connected with the river at 30 and 70 feet beneath the surface, the experiment promises fair to make us acquainted with the nature and quality of the water at greater depths, whether it may be entitled to the name of an artesian spring or not.

8. Note on the Japanese Mirror, by the Secretary.

[Printed in the present number, page 242.]

9. Mr. B. H. Hodgson's paper on the *Buceros Homrâi* of Nipal, and Dr. Bramley's remarks on the skeleton of the same bird, were then read.

The *B. Homrâi* is the largest species yet discovered of the singular genus, measuring 4½ feet from the bill to the tail, and 6 feet in expanse of wings.

It tenants the lower range of hills from Haridwár to Assam, and is not truly migratory, though it retires to the neighbouring mountains during the breeding season. It has been a prevalent opinion that the Buceros is carnivorous, but Mr. H. has on shooting two species out of four, found their stomachs filled exclusively with fruit, and the other two in domestic confinement shewed always a great aversion to frogs and lizards, and refused to touch rats, mice, and birds; they were fed entirely on fruits and boiled rice: both would however eat fresh meat, when vegetable diet was out of their reach.

The *Homrâi* reaches its full size in four and five years; it is gregarious and sedate; seldom alights on the ground; its ordinary voice resembles the croaking of a bull-frog, but when excited, it vociferates vehemently like the braying of an ass. The bill is nearly a foot long, very large, cleft to the eye, and strongly arched: the cutting edges brittle and broken in the centre: the casque, about 8 inches long, broad, flat at top; front in young birds pointed and continuous, becoming crescented and separated from bill in maturity and colour of casque; upper mandible, deep waxen yellow, passing into orange red; lower mandible, white; base of both, anterior of casque, inner surface of bill, &c. black; iris, crimson; legs, green grey; skin round the eye, black; body and wings, chin and junction of the head and neck, black; neck yellowish white; tail pure white with a broad black bar; all but the two first quill feathers of the wings broadly whitened at either extremity. Tips of the long coverts also white. The female and young are marked like the male.

The anatomy of the skeleton is minutely described by Dr. Bramley, particularly the connection of the horny and bony substance of the mandibles.

The tongue is fixed to the lower mandible, small, and triangular, without papillæ.

The cervical vertebræ are only 12 in number; the dorsal, seven, and capable of motion, whence he infers a limited power on the wing.

The *os hyoides* consists of five bony portions; the superior *larynx* is formed anteriorly and laterally of bone, and the *annuli* of the *trachæa* are all more or less ossified.

The thanks of the Society were voted for the several communications of the evening.

Kasya Coal.

Mr. W. Cracroft's information respecting two new localities of the Kasya Coal is contained in his letters addressed to the Honorable Sir Edward Ryan, dated May, 1832, from which the following are extracts.

"I hasten to give you a piece of information, which will interest you. I have just returned from Sanárím, where Mr. Furnell discovered a stratum of Coal cropping out on the side of a hill. I went down to examine it instantly, and found it with its cieling of new sandstone of an ochry color; helow that a stratum of six inches light bituminous coal, a little tinged with ochre: next a stratum of 18 inches fine bituminous coal; under this, slate very bituminous, about six inches, and a floor of bituminous sandstone, to what depth I know not; it extended right and left as far as the *jangal* would permit us to see, and had little or no dip in any direction. The accompanying sketch (Plate VI. fig. 4) will give you a better idea of it than my verbal description. I send you specimens of all but the sandstone, which was lost on the road.

23*rd*.—"In consequence of our desire for coal becoming known at Chirra Púnjí, two specimens were brought me yesterday, one of which resembled the Sanárim bituminous coal, the other the slate. I therefore inquired for some one to shew me whence they came. To-day we mounted our horses, Col. Watson, Mr. Rhodes, Mr. Furnell, and myself, accompanied hy nine coolies with pickaxes, &c. and were conducted to the foot of the limestone hill, west of the Sanatarium. After passing the stratum of limestone, we came to sandstone, and were shown a stratum of coal, (specimen No. 1,) two feet eight inches thick, with a roof (No. 2); helow the coal, was No. 3, but we could see no further. This was satisfactory enough, so we left our coolies to load themselves with coal, and Mr. F. and myself mounted still higher to see if there might not be another stratum. We passed various sorts of sandstone, climbing nearly perpendicularly about sixty feet, where we found lumps of fine coal bedded in clay; and proceeding at an angle of ahout 35 degrees, perceived evidently another stratum cropping out, but huried in the clay. Leaving this we reached the top of the hill, whence we enjoyed a heautiful view of the Sanatarium. Our guide brought us back by an easier road; hut imagine our delight, at finding in our descent the continuation of the lower stratum of coal perfectly bared, perpendicular from top to bottom; here I of course took new measurements and specimens, of which

A is the roof.

B bituminous coal, 2 feet.

C slaty coal of various consistence, 2 feet 4 in.

D coal tinged with other joints nearly perpendicular, 2 feet 1½ inch.

Depth of the coal stratum 6 feet 5½ in.

E is a specimen of the floor.

F found at top.

The rock being nearly perpendicular enabled me to come to pretty accurate measurement, and I found the shell limestone between 40 and 50 feet below the coal. I measured more than 39 feet of the stratum of limestone, and estimated about twice as much more below that, but the quality and texture are not quite the same, (but of this hereafter.) I consider the highest point we reached, to be

about 400 feet above the place where we left our horses. The accompanying sketch, Plate VI. fig. 5. exhibits a section of the hill.

The stratum sinks about half an inch in a foot toward the south, but the roof, where we found it projecting, bassets nearly horizontally, and the face of the rock bears about N. E. This stratum of coal will be invaluable to the station. I shall forward a bag, by the first opportunity, for your inspection; it can be supplied at Chattak at 6 annas per maund, with good profit to the supplier, and the quantity is, I imagine, inexhaustible. I have no doubt it will be followed up, and found nearer the head of the pass, i. e. at Músmye. A box of specimens will reach you by Dák bangy: they will I hope enable you to judge fully of the value of the discovery. I am certain that these mountains, the aptitude of which to support colonists will inevitably lead to their colonization, contain resources far beyond our present estimation of them. Mr. Furnell discovered a large cavern, from whence he brought away a specimen of sulphate of lime in silky crystals. We also found an extraordinary natural well: a stone thrown into which fell into water at the end of about three seconds from dropping it."

Salem Iron Works.

The following memoranda on the subject of the Salem works, calculated soon to become important from their magnitude and from the well known zeal of their founder, are gleaned from private documents, with the perusal of which we were favored by the Agents of Mr. Heath, in Calcutta, who also presented his specimens to the Society:

The mine from which Mr. Heath draws his supply of ore is situated in the Salem district, close to a place noted on Arrowsmith's large map of India as *Shendamangalam*, in lat. 11° 21′ 30″ and long. 78° 17′ 30″.

There is abundance of fuel in the neighbourhood: it is within 20 miles of the river *Kavari*, which is navigable to the coast in the country boats.

The iron ore, a magnetic oxide of great purity, is stated by Mr. Heath to form hills of considerable size; it is in small grains, interstratified with quartz, and occasionally in regular octohedrons. This crystallized oxide is one of the richest ores of iron known; it consists according to Berzelius of 72 parts of peroxide and 28 of protoxide of iron. Some of the crystals sent are covered with a white micaceous coat, which is esteemed a sign of superiority by the natives: the specific gravity of the octohedral crystals was found to be on an average 5.136 at 60°, which is rather more than is allowed in mineralogical works. Mohs, the most accurate physiographist, calls it 5.096—Phillips, only 4.4.

On reference to the manuscript journals of the late Doctor Voysey, (from which an extract is given in the foregoing pages,) it appears that in the Godaveri iron works, ores of iron sand, and iron clay are used, which are more easy to reduce than the pure magnetic oxide, although far less rich in metal.

Mr. Heath has hitherto confined his attention to the manufacturing of bar iron, for which purpose he has set up blast and puddling furnaces, with blowing engines, fineries, and machinery for working the iron into bars commissioned from England, capable of giving a monthly return of from thirty to forty tons. We know not precisely whether Mr. Heath has as yet matured his substitution of the methods of our own country in the place of those which have from time immemorial prevailed among the natives of the place: the specimens at present under examination, are evidently intended to illustrate the native operations. We should

imagine the greatest drawbacks to the success of the new method must be in the want of coal fuel, and of ready access to a market of sufficient consumption.

Mr. Heath's specimens of the native process of making steel are interesting, on account of the ignorance which still prevails in Europe on this subject.

According to the author of the Treatise on Manufacturing Iron and Steel in Lardner's 'Cabinet Encyclopedia,' our latest authority on such subjects, the right nature of Indian steel seems to be still as much an enigma as ever: nothing having been added to our knowledge since Dr. Pearson's paper on the Wootz steel, in the Philosophical Transactions, Vol. XVII. There it is asserted that the steel is made directly from the ore by fusion, and that it has never been in the state of wrought iron. "The mass has evidently been fused," says Dr. Pearson, "but the grain of the fracture is such as I have never seen in cement-steel before it has been hammered or melted;" and he suggests, that the variegated appearance of articles manufactured from it, is owing to portions of the oxide of iron having escaped metallization when melted up with the rest of the matter.

Dr. Voysey however expressly describes the compact texture and brilliant white colour of the iron used for conversion into steel; and in confirmation we have now from Mr. Heath, "the actual crucibles with broken fragments of iron bars, (about one lb. in weight each) charged ready for fusion, along with uncharred wood and green leaves;" the wood used for the purpose is that of the *cassia auriculata*, and the green leaves are those of the *asclepias gigantea*." The cementation takes 24 hours, and the fire is then urged so as to fuse the steel. On breaking the crucible it is found in a bemispherical button, radiated on the surface as from crystallization. It has gained somewhat in weight; it is very hard, and requires to be *annealed* three or four times, covered with clay, and exposed to a red heat for 12 or 16 hours. This would be an argument that too great an absorption of carbon had taken place, and that the metal was in fact cast iron. 100 grs. of Mr. Heath's wootz, however, when dissolved in sulphuric acid, left but $\frac{1}{10}$ grain of carbonaceous matter, which is less than the usual proportion.

The brittleness of the wootz steel has been notorious ever since Damascus blades have been known in Europe and Asia. Tavernier describes the difficulty of working up the metal in his day as precisely what is experienced in the specimens before us. "The steel susceptible of being damasked comes from the kingdom of Golconda; it is met with in commerce in lumps about the size of a half-penny cake: they are cut in two, in order to see whether they are of good quality, and each makes half the blade of a sabre." He adds, that if the European methods of hardening this steel were followed, it would break like glass. Reaumur and others have always alluded to the same difficulty of forging it.

The cause of the brittleness may be in the over-carbonization, alluded to above; otherwise it must be sought in the wood used for the purpose; this point has not yet received elucidation, &c. nor from the unsatisfactory nature of all chemical analyses of iron is it likely to be soon explained.

Mr. Heath's *chromate of iron* ore seems to be of a very good quality, containing little or no foreign matter. It is of a dark greenish-grey or nearly black color, granular texture, in massive lumps, inclining to a octohedral form: not magnetic, infusible, insoluble in acids: specific gravity 4.545 at 90°.

Nitrate of potash requires more than a red heat to effect its decomposition: by caustic potash it is more readily acted on, and discharges copious fumes of a greenish, yellow colour, found to consist of sublimed chromate of potash soluble in

water. The fused mass in the crucible, also, on solution yields a copious yellow precipitate with acetate of lead; but the operation requires to be repeated several times before complete decomposition of the ore takes place.

The crystallized *bichromate of potash*, made by Mr. Heath, appears to be perfectly pure, and would be sure of a market in Europe. It is this substance which is used for dyeing. A short description of the process is given in Ure's translation of "*Berthollet's Arts of Dyeing*." All shades of orange and yellow may be produced by adding to the solution of the salt, acids or alkalies; the acids rendering the color deeper, and the alkalies, lighter. The mordant generally used is sugar of lead. The salts of mercury may also be employed, but they are more expensive." Mr. Heath recommends the bichromate as suitable for the dyeing of Choppahs, Bandannoes, &c. Cotton twist however would be dyed much cheaper at the place where the dye was extracted from the chromate of iron, as in this way the process of crystallization would be rendered unnecessary. Mr. Heath has, in anticipation of a demand for this new product, established an extensive apparatus for its manufacture, and another for the manufacture of acetic acid, so as to enable him to supply the sugar of lead at the cheapest rate.

Chrome yellow, or chromate of lead, is much used as a pigment, but it has hitherto borne a very high price. America and Russia have furnished the greater part of the European supply: the Americans prepare it with saltpetre taken from this country, and chromate of iron from Baltimore and New Jersey, an ore by no means so pure as that discovered in Salem. It is natural to expect therefore that all the preparations of chrome will soon be advantageously exported from India.

The chrome yellow might find a market in China and the Burmese empire, as a substitute for the yellow sulphuret of arsenic, now extensively employed in the ornamental work of the lacquered-ware.

2.—Medical and Physical Society.

2nd June, 1832.

Messrs. D. McLeod, J. Stokes, S. Ludlow and O. Wray, proposed at the last Meeting, were elected Members of the Society; and Drs. Blest and Passaman, of Chili, were elected Corresponding Members.

Cloquet's Quarto Work on Anatomy, and Manec's Plate of the Cerebro-Spinal Nerves recently received, were placed on the table; also Specimens of *Chulchulera*, (lichen,) forwarded by Dr. Falconer.

The following communications were then laid before the Society:

1. A letter from Mr. Cope, stating, that in proceeding up the Ganges to Dinapore, he had met with a species of Argemone; the *A. Mexicana*, the seeds of which contain a large proportion of fixed oil; and he observes, that prior to his leaving England, a quantity of oil of the *A. Mexicana*, the produce of the West Indies, had been used in London as a mild purgative. Mr. Cope wishes to bring this subject before the notice of the Society, in hopes that the plant may afford an useful addition to the Materia Medica of India.

2. A letter from Superintending Surgeon G. Playfair, to the Medical Board, containing a brief notice of an Epidemic Influenza that had appeared at Merut, on the 7th April; and in the course of 10 days, affected above 200 men of H. M. 26th Foot. The disease was marked by violent catarrhal symptoms, and pains in the back and limbs. The Epidemic appeared at Bareilly early in April, but no instance of a fatal termination was known.

3. A letter from Mons. Desjardins, containing the procès-verbal of the Meetings of the Society of Natural History of the Mauritius, from the 20th December, 1831, to the 17th January, 1832.

4. Dr. Casanova's account of the Medical properties of the Mineral Waters of San Pedro, in the Havanna; being the result of an examination of those waters, and a topographical account of the district, undertaken by order of the Colonial Government. The springs alluded to are thermal sulphureous; and their medical properties were found to be diuretic, aperient, and tonic. The treatise embraces an account of the diseases in which these waters have been found useful, as well as instructions for their employment.

5. Dr. Woodburn's account of Cholera, in the district of Sherghatí, presented by the Medical Board.

6. Mr. A. K. Lindesay's case of complicated Visceral disease, in which urinary calculi were found on dissection, presented by the Medical Board.

7. Observations on Hepatic Abscess, by W. Geddes, Esq. Surgeon of the Madras European Regiment.

8. Mr. Hutchinson's letter proposing the publication of a Quarterly Medical Journal;—to consist of a selection from the best medical publications; with an appendix to contain any papers of minor importance, or ephemeral interest, that might have been laid before the Society in the interval; and a precis of the latest medical intelligence, as well as an account of the proceedings of the various scientific bodies at the Presidency. The work to be supplied to the members of the Society at prime cost, or even gratuitously; and a small profit realized by the sale of extra copies at a higher price.

The expediency of making some of the Society's publications convey early intelligence of important discoveries in medicine, and of the progress of medical science in general, without any expence to the members, has been already twice brought to the notice of the Society, and some steps taken with a view of altering the form, and very much increasing the size of the Monthly Circular; for the purpose of comprehending an account of the progress of medical science in other parts of the world, so arranged as to admit of being bound up in a volume at the end of each year. The Society's annual publications would thus comprise one volume, principally composed of the discoveries in every branch of the profession in other parts of the world:—besides the volume of Transactions, as heretofore published.

9. Mr. Raleigh's remarks on an instrument for depressing the Cataract, by which he hopes to secure all advantages belonging to the native mode of operating, when performed in the best and most successful manner; at the same time, that many of the dangerous consequences frequently attendant on their mode of operating, may be avoided. A specimen of the instrument devised by the author, was sent for the inspection of the Society; its shape somewhat resembles one blade of a midwifery forceps on a very minute scale. It is fixed in a handle like the common couching-needle: the blade is about an inch in length; the two-thirds next to the handle being round, the remaining third spreads, so as to form an oblong oval shallow spoon, the centre of which being cut out leaves an oval ring; and its extremity is bent slightly forward; the widest part of the oval measures about the tenth of an inch, but the thickness does not exceed that of a couching-needle. The mode of operating is as follows:—with a lancet-shaped knife, a vertical puncture is made the eighth of an inch in length through the

coats of the eye, three lines behind the junction of the cornea and sclerotic ; and the new instrument is introduced with its concavity forwards and edges vertical ; it is carried behind the lens, over the upper edge of which the concavity of the instrument is placed, and depression effected in such a way as to separate all the attachments of the capsule, and to lodge the lens and its capsule at once below and behind the pupil ; the handle of the instrument may then be rolled between the finger and thumb, so as to disengage its blade from the lens ; and the instrument is to be withdrawn. The author considers Mr. Breton's estimate of the failure of couching in the hands of the natives, (taken probably from their own operators' representations,) to be erroneous ; and that instead of 10 per cent. of failures, 40 or 50 per cent. might be a more correct average. He says, from having seen the native oculist mentioned by Mr. Breton, put out four eyes in succession on the same morning, in two of which cases the lens was pushed into the anterior chamber, and in one the iris torn in half ; and from having constantly patients brought to him whose eyes were destroyed in consequence of the native operation : he is inclined to consider couching as performed by the native oculists, barbarous and unscientific. He altogether discredits the account of the native operation having been performed seven times on one eye, with ultimate success. The author states, that in a fair proportion of cases in which the new instrument has been used, the operation has been successful ; but he cannot yet decide whether the subsequent inflammation, generally speaking, is greater than after the European mode of couching. In several cases, however, it has been severe ; and he thinks constitutes the principal, and, perhaps, the only solid objection to the operation performed in the manner he has now advised.

Mr. Mercer's paper relative to vaccination and varioloid diseases was then read and discussed by the Meeting.

3.—Agricultural and Horticultural Society,

The 14th June, 1832.

Sir Edward Ryan, President, in the Chair.

The following Gentlemen were admitted Members of the Society, viz.

1.—Lieut. Colonel Thomas C. Watson, European Regiment.

2.—Mr. Richard Hunter, C. S., now of Cuttack.

3.—Captain W. Badenach, 57th N. I.

4.—Mr. George T. Lushington, C. S.

The following letters were read :

1. From the Secretary of the South Carolina Agricultural Society, to Mr. Piddington, Foreign Secretary, dated 31st October last, acknowledging receipt of this Society's circular letter of the 1st of the preceding March : offering to supply any indigenous plants and seeds that may be required ; and presenting some publications of the South Carolina Agricultural Society.

2.—Mr. Piddington was requested to acknowledge the receipt of these publications, and to procure a parcel of seeds for the South Carolina Society.

3.—From Captain Cowles, two letters, dated Diamond Harbour, 8th and 24th ultimo, presenting two samples of Sugar, of his manufacture, and furnishing some particulars of the proofs, &c.—The thanks of the Meeting were voted to Captain Cowles.

4.—From Mr. Kyd, dated 9th ult. presenting some China Potatoes for seed.

The Secretary stated that he had forwarded the Potatoes to the Allipore Garden.

5.—From Mr. Willis, dated 9th ultimo, recommending that Government should be requested to require from Major Burney, the Resident at Ava, as large a quantity as possible of the long staple Pernambuco and other good descriptions of Cotton Seed, grown in that country, and that he be furnished with American Cotton and Tobacco Seeds for introduction there.

The Secretary informed the Meeting, that he had forwarded a copy of Mr. Willis' letter to Government, and had offered, with reference to the suggestion in the latter part of it, to supply any quantity of Seeds that might be required.

6.—From Messrs. T. A. Pitkin and T. C. Robson, dated 22nd ultimo, presenting specimens of American Flax and Tobacco, grown on their lands in the Soonderbunds, from seeds furnished by the Society, and requesting instructions as to the manner of curing the latter.

The Secretary was requested to furnish these gentlemen with copies of the methods followed by Mr. Deverine, the Society's Superintendent at Akra.

7.—From Mr. Pattle, with a Mangoe of uncommon size, grown in his own garden, and which Mr. Pattle considers the result of care and cultivation. It was found to weigh 145 Sa. wt. and to be 20. 4 by 17. 4 inches in circumference.

8.—Mr. Richard Hunter presented a specimen of Pernambuco Cotton, found by him in Cuttack, which appeared to be of good quality, and to thrive well, but he had not been able to obtain any information as to how it had been introduced there: the specimen was approved of.

9.—Mr. Robison presented a specimen of Seychelles Cotton, grown in his garden, from seed furnished by Mr. Palmer, to the Society, in 1830.

10.—Dr. Carey presented some Nankeen Cotton and Cotton Seed, grown in his garden at Serampore.

11.—Mr. Dobbs presented some Havannah Tobacco Seed, also some Chirimoya Seeds, in the name of Colonel Hezeta.—The thanks of the Meeting were offered to Col. Hezeta.

12.—Mr. Strong presented some Sea Island Cotton grown in Intally.

13.—Mr. McKean forwarded a quantity of Pernambuco Cotton grown at Duckinsore, near Calcutta, by Mr. Hastie, from seed furnished to the latter Gentleman by the Society.

The Secretary reported, that he received seven parcels of Silk, and twelve of Tobacco, from competitors; and an early day was therefore fixed, for a Meeting of the Committee of Prizes, and awarding the premium offered by Government.

4.—Natural History Society of the Mauritius.

Tuesday, 25th October, 1831.

Mr. L. Bouton read a letter from M. J. Desjardins, addressed to the President, proposing that a request should be made to M. Lyall for the portrait of his father, their late colleague, Dr. R. Lyall: whereupon Mr. Charles Telfair, President, who was in possession of this picture, immediately tendering it as a boon, the Society accepted it with the liveliest acknowledgments.

The same party read also the Secretary's reply to the Baron G. Cuvier, expressive of the honor felt by the Society on the possession of his bust.

M. J. P. Goudot, cor. mem. Mus. Roy. of Paris, and travelling naturalist, was introduced by M. Faraguat, on the occasion of his arrival on a projected excursion to the isle of Madagascar. He offered to the Society a collection of the land shells of France, and of the environs of Palermo, in Sicily.

M. Leinard, sen. read the description of a new species of fish of the genus *apphreus* CUV. which he names *A. capuchonné.* This is the third of the species existing in our seas. Commerson was the first to make it known in 1770. Upon the mention of this indefatigable naturalist several members again agitated the proposition of erecting a monument to his memory, and a subscription was instantly set on foot among the members present.

M. Lislet Geoffroy presented two Nos. of the *Journal des îles de France et de Bourbon*, 1786, containing remarks on *Nauscopie.*

The Society noted the publication of some of the papers read at its meetings, in the *Revue des annales des sciences naturelles* of December 1830. Also the abstract of their zoological researches in the *Jour. Zool. Soc.* of London.

Wednesday, 23d November, 1831.

M. Dalmas, of Bordeaux, Mr. James Calder, and Mr. James Irving, of Calcutta, were elected corresponding members.

The Secretary announced the death of three individuals in a way connected with the Society; Will. Roscoe, Esq. the Botanist: the Chevalier Aubert Du Petit Thouars, author of *Flore des îles australes de l'afrique*: and M. Auguste Céré, native of the Mauritius, formerly Director of the Botanic Garden of Pamplemousses.

The Secretary read letters from Professor Quoy and the Baron de Ferussac, thanking the Society for the diplomas awarded them.

Also from M. Marcelin Sauzier, describing the eruptions of lava in Bourbon last July, and forwarding specimens.

Dr. Casanova announces that he is forwarding the Society's interests at Calcutta. Mr. Jules Verreau, member of the Cape of Good Hope Institution, offers his services as taxidermist.

Mr. V. J. Sganzin, Capt. Art. St. Marie, Madagascar, was elected a corresponding member at Lorient. A collection of butterflies was presented in his name, containing particularly fine specimens of the *Uranie Riphée.*

M. Dalmas presented for the museum several *lusus naturæ*; weapons of the savages; and the skin of a lioness which died on the island.

M. Rob. de Chazal presented the model of an ancient monument at Rome, supposed to be the Sybil's temple.

The President presented two American serpents preserved in spirits, and Mr. B. Telfair a thick bamboo, the joints of which which were covered with *anatiffes*, from the Savannah.

The following acquisitions to the library were announced.

Hortus Indicus Malabaricus of Von Rheed, 12 vols. fol.

Herbarium Amboinense of Rumphius, 6 vols. fol.

Hooker's Botanical Miscellany, one chapter.

A member read the description of two fish of the *Filous* genus, one of a reddish green, the other clear yellow, in other respects agreeing.

Another member read also the description of a fish which he believed to be a new species.

Mr. J. Desjardins read two short notices on the *libellule bordée* and the *libellule demi-transparente*, which are not found in the *Encyclopedie Methodique*, and are thought to be new.

VI.—*European Intelligence.*

Results obtained from the Seed of the Mango.

The mango tree, *Mangifera Indica*, L. has been transported from the East Indies to St. Domingo, and the other neighbouring islands, where it is now exceedingly abundant. In consequence of which, its products may now find useful applications; to forward which purpose, M. Arequin has devoted his attention to the analysis of the seed. The fruit is a fine mass of pulp, very agreeable in the estimation of some, and the seed or grain lies in the middle, having the form of a kidney, and inclosed in a parchment-like integument.

The mango pulp contains much crystallizable sugar, and also citric acid and gum.

The mango seed is remarkable for the large quantity of gallic acid present, and for the presence also of stearic acid, and for the useful state of its starch. When a seed is cut with a knife, it gives a deep blue color to the latter; when touched with persulphate of iron, it acquires a fine blue color, both effects due to gallic acid present.

Five pounds and a half of the seeds being worked upon, by various digestions in water, alcohol, &c. and subsequent evaporations, gave about eight ounces and a half of crystallized gallic acid.

When the pulp of the seeds had been exhausted by water, it was acted upon by alcohol, and a substance obtained by evaporation from the alcoholic solutions which crystallized, and had the following properties; it was perfectly white; was insipid and inodorous: if fused at 70° C. (158° Farht.), on cooling, it crystallized in mingling long acicular forms; it is insoluble in water; it reddens moistened litmus paper; its solution in weak alcohol reddens infusion of litmus; it is quite soluble in oils and fatty bodies; it unites to salifiable bases, forming well characterized salts (soaps); when made into a taper, it burns like wax, with a fine white flame. This substance has all the physical and chemical characters of stearic acid, which therefore exists, ready formed, in the vegetable kingdom. Its quantity was rather more than two ounces.

When the pulp, thus far exhausted, was treated with æther, a fatty matter was obtained from it; fusing at 30° C. (86° Farht.); soluble in hot æther to any extent; insoluble in rectified alcohol; liquifying in the mouth like cocoa butter; when formed into a candle, burning like tallow; having the consistence of tallow, and being of the same nature as the butter of cocoa. The powdered grain treated with water yields a small portion of this butter in a very pure and fresh state. The quantity obtained from the original quantity of seed was one ounce and a half.

After all these operations, the starch was separated by washing in water; its quantity amounted to 32½ oz. or rather more than half the weight of the dried seeds. When the recent seeds were worked with for starch, 1 lb. always yielded about 6 oz. of starch, and by drying lost about 6 oz. of water.

Besides these substances the following were also obtained; lignine, about 5 oz. gum, 2½ oz.; tannin, 200 grs. nearly; brown resin, 200 grs.; green resin, 144 grs. and a little vegetable albumen.

M. Arequin then describes processes for obtaining gallic acid from the mango seed, either with or without the use of alcohol, and for the preparation of ink with this substance instead of galls. If obtained in abundance, the seeds may be very useful for these and analogous purposes.—*Journal de Pharmacie*, 1831, p. 421.

Catalogue of Indian Birds.

The following catalogue comprises, first, the collection taken home by Major James Franklin, F. R. S. &c. made during his tour up the Ganges between Calcutta and Benares, and in the Vindhyan range of hills between the latter place and Garra Mandela on the Nerbada: these are all numbered in the order of their systematical arrangement by the Secretary of the Zoological Society, as published in the proceedings of that body:—and, secondly, the collection of rare birds from the Himalayan mountains, presented to the Zool. Soc. by Mr. John Gould, A. L. S. most of them before undescribed. In characterizing the latter, Mr. Vigors points out the identity of a large proportion of their forms with those of northern Europe, observing that the elevation of their native mountains places them on an equality in point of climate with the birds of more northern latitudes. At the same time, he adds that many of the forms peculiar to southern Asia and the Indian Archipelago are found intermingled with those of the northern regions. Mr. Gould's birds will be recognized in the catalogue by their being unnumbered. A few Chinese birds will also be found classified with the rest, and indicated by the letter *C.* They were presented to the Zool. Soc. by H. H. Lindsay, Esq. of Canton, who procured them during the summer of 1830, in the neighbourhood of Manilla; Mr. Vigors points out fifty new species, of which he has as yet only characterized a few. It must be a subject of regret that the native names were not inserted where it was possible to ascertain them, as that would have much enhanced the value of the catalogue to Indian naturalists. We are indebted to Dr. Warlow's kindness and industry for arranging the valuable materials in their present state, gleaned from the Journal of the Zoological Society's proceedings.

Ordo I. RAPTORES.

Fam. Falconidæ.

Sub-Fam. *Aquilina.*—Genus *Aquila.*

1. Aquila Vindhiana. *Aq. pallidè brunneo variegata; capite, pectore, remigibus secundariis, caudâque saturatioribus, hujus apice albido graciliter marginato; remigibus primariis nigris; capitis collique plumis pallido-rufo lanceolatis.*

   Longitudo 26 unc.

   Cawnpoor Eagle, Lath.?

Sub-Fam. *Falconina.*—Genus *Hierax.*

Hierax erythrogenys. *Hier. capite et corpore suprà, caudâ femoribusque intensè atris; gulâ, collo in fronte, corporeque subtùs albis; strigâ a rictu ad aures extendente rufâ; rostro albo, pedibus nigris.*

Statura *Hier. cærulescentis.*

Genus *Falco*.

2. *Falco Subbuteo*, Linn. *Hobby*, Penn. *Le Hobereau*, Buff.
3. *Falco Chicquera*, Daud. *Chicquera Falcon*, Lath. *Le Chicquera*, Le Vaill.
4. *Falco Tinnunculus*, Linn. *Kestril*, Penn. *La Cresserelle*, Buff.

Sub-Fam. *Buteonina*.—Genus *Buteo*.

5. *Buteo Bacha*. *Falco Bacha*, Daud. *Bacha Falcon*, Lath. *Le Bacha*, Le Vaill.

BUTEO HOLOSPILUS. *But. supernè brunneus, subtùs brunnescentirufus; capite, fasciisque duabus remigum rectricumque fuscoatris; nuchâ et dorso, collo in fronte, pectore abdomineque toto, tectricibusque alarum maculis albis ocellatis, harum maculis diminutioribus.*

Staturâ tertiâ parte minor quàm *Buteo Bacha*; ei speciei simillima, differt tamen capite lævi, corporeque toto maculato.

Genus *Circus*.

6. CIRCUS TEESA. *Circ. capite corporeque rufo-brunneis, plumarum rhachibus fuscis; dorso imo, rectricibusque ferrugineis, his fasciis subobsoletis fuscis septem circiter notatis; remigum tectricibus abdomineque albescenti notatis; femorum tectricibus crissoque rufescenti-albis fronte, gulâ, nuchæque fasciâ gracili albis; rostro pedibusque flavis, illius apice nigro.*
Longitudo 17½.
Zuggun Falcon, Lath.?
7. *Circus cyaneus*. *Falco cyaneus*, Linn. *Hen Harrier*, Penn.
8. *Circus melanoleucus*. *Falco melanoleucus*, Gmel. *Black and white Indian Falcon*, Penn. *Le Tchoug*, Le Vaill.
9. *Circus rufus*, Briss. *Moor Buzzard*, Penn. *Le Busard*, Buff.

Sub-Fam. *Milvina*.—Genus *Elanus*, Savigny.

10. *Elanus Melanopterus*, Leach. *Le Blac*, Le Vaill.

Fam. *Strigidæ*.—Genus *Otus*.

11. OTUS BENGALENSIS. *Ot. pallidè rufescens, fusco alboque undulatim variegatus; nuchæ pectorisque plumis in medio strigâ latâ brunneo-nigrâ notatis; abdomine fusco graciliter fasciato; remigibus rectricibusque lateralibus prope apicem brunneo fasciatis, his mediis per totum longitudinem similiter notatis.*
Longitudo 20.
Dr. Latham alludes to this as a variety of the *great-eared Owl*.

Genus *Noctua*.

12. NOCTUA INDICA. *Noct. cinereo-brunnea; capite guttis parvis albis, alis grandioribus notatis; abdomine albo, maculis brunneis lunulaties notato; remigibus rectricibusque albo fasciatis; regione circumoculari, gulâ, fasciâque subgulari, ad aures extendente albis.*
Fœm. *magis rufescens, abdomine magis fasciatim maculato.*
Longitudo 9.
Indian Spotted Owl, Lath.?

NOCTUA CUCULOIDES. *Noct. brunneo-fusca; capite, dorso, tectricibus alarum, corporeque subtus albo graciliter fasciatis; remigibus externè albo maculatis; rectricibus utrinque fasciis albis quique notatis; gulâ albâ.*

Ordo II. INSESSORES.

Tribus Fissirostres.

Fam. *Meropidæ*.—Genus *Merops*.

13. *Merops Philippinus*, Linn. *Philippine Bee-eater*, Lath. *Grand Guêpier des Philippines*, Buff.

14. *Merops viridis*, Linn. *Indian Bee-eater*, Lath. *Guêpier à collier de Madagascar*, Buff.

Fam. *Hirundinidæ*.—Genus *Hirundo*.

15. *Hirundo Klecho*, Horsf. *Klecho Swallow*, Lath. *Hirondelle longipenne*, Temm.

16. Hirundo filicaudata. *Hir. supra purpurascenti-atra, remigibus fuscis; corpore subtùs maculisque rectricum omnium lateralium albis; capitis vertice rufo; rectrice utrinque laterali elongato, ad apicem gracillimo.*
Statura *Hir. ripariæ*.
Wire-tailed Swallow, Lath.

17. *Hirundo riparia*, Linn. *Sand Martin*, Penn. *L'Hirondelle de rivage*, Buff.

Genus *Cypselus*.

18. *Cypselus affinis*, Hardw. *Allied Swift*, Hardw.

19. *Cypselus Pulmarum*, Hardw. *Balassian Swift*, Lath.

Fam. *Caprimulgidæ*.—Genus *Caprimulgus*.

20. Caprimulgus monticolus. *Cap. pullidè cinerco-brunneo, rufo, fuscoque sparsim variegatus; abdomine rufescenti-fusco fasciato; remigibus secundoriis rufo nigroque fasciatis, primariis brunnescenti-nigris, quatuor externis fasciâ latâ albâ in medio notatis; rectricibus sex mediis faciis gracilibus nigris undulatis, duabus utrinque lateralibus albis apicibus brunneis.*
Fœm. *fasciâ alarum rufâ; caudâ concolori (sine albo)*.
Longitudo 10.
Great Bombay Goatsucker, Lath.?

21. *Caprimulgus Asiaticus*, Lath., Ind. Orn. *Bombay Goatsucker*, Lath.

C. Caprimulgus macrotis. *Cap. intensè brunneus, rufo undulatus, corpore subtùs caudâque rufo fasciatis; capite aurito scapularibusque rufo-brunneis, fusco undulotim punctulatis nigroque notatis; torque jugulari albo ad nucham extendente rufo.*
Longitudo *corporis*, 15; *rostri* ad frontem $\frac{3}{8}$, ad rictum, $1\frac{1}{4}$; *alæ* a carpo ad apicem remigis 2dæ, $10\frac{1}{4}$; *caudæ*, 7; *tarsi*, $\frac{1}{2}$.

Fam. *Halcyonidæ*.—Genus *Alcedo*.

22. *Alcedo Bengalensis*, Gmel. *Little Indian Kingsfisher*, Edw.

23. *Alcedo rudis*, Linn. *Black and white Kingsfisher*, Edw.

Alcedo guttatus. *Alc. cristatus, supra ater, maculis rotundis albis guttatim notatus; subtus albus; colli lateribus pectoreque atro maculatis.*
Statura *Alc. maximi*.

Genus *Dacelo*.

C. Dacelo Lindsayi. *Dac. corpore suprà brunneo, olivaceo et viridi nitente, guttis rufo-albidis notato, pectore abdomine crissoque albis, illorum plumis, medii abdominis exceptis, olivascenti-viridi marginatis; capitis pileo saturatè olivascenti viridi, vittâ-superciliari lazulinâ circumdato, deinde vittâ per oculos nigrâ, alteráque suboculari ferrugineâ marginato; gulâ juguloque ferrugineis; strigâ utrinque maxillari lazulinâ; remigibus fuscis; rectricibus omnibus ad apicem, duabus utrinque externis ad latera, ferrugineo notatis; rostro subbrevi.*

Longitudo *corporis*, 10½; *rostri*, 1⅜; *alæ* a carpo ad apicem remigis 3tiæ, 4⅛; *caudæ*, 4½; *tarsi*, ⅝.

C. DACELO LESSONII. *Dac. corpore suprà brunneo, olivaceo et viridi nitente, albido guttato; capitis pilco saturatè olivaceo-viridi, vittâ superciliari cæruleo-viridi circumdato, deinde vittâ alterâ nigrâ marginato; collo in fronte corporeque subtùs albo, pectoris abdominisque plumis viridi-brunneo marginatis; strigâ utrinque maxillari viridi; remigibus fuscis; rectricibus omnibus ad apicem, tribus utrinque externis ad latera, ferrugineo notatis; rostro sublongo.*

Longitudo *corporis*, 11¾; *rostri*, 1⅞; *alæ* a carpo ad apicem remigis 3tiæ, 4¼; *caudæ*, 4¾; *tarsi*, ⅝.

Genus *Halcyon.*

24. *Halcyon Smyrnensis. Alcedo Smyrnensis*, Linn. *Smyrna Kingsfisher*, Lath. *Martin pêcheur de la côte de Malabar*, Buff.

Tribus DENTIROSTRES.

Fam. *Muscicapidæ.*—Genus *Muscicapa.*

25. *Muscicapa Banyumas*, Horsf. *Banyumas Flycatcher*, Lath. *Gobemouche Chantuer*, Temm.

26. *Muscicapa nitida*, Lath., Ind. Orn. *Nitid Flycatcher*, Lath.

C. MUSCICAPA OCCIPITALIS. *Musc. corpore supra pallidè lazulino, capite colloque splendidioribus; abdomine lazulino-albido; maculâ occipitali grandi, torqueque gracili jugulari, sericeo-atris.*

Longitudo *corporis*, 6½.

Genus *Muscipeta.*

27. *Muscipeta Paradisi. Muscicapa Paradisi*, Linn. *Paradise Flycatcher*, Lath. *Gobe-mouche Tchitrec-be, roux et blanc*, Le Vaill.

28. *Muscipeta peregrina. Parus peregrinus*, Gmel. *Crimson-rumped Flycatcher*, Lath. *Gobe-mouche Oranor*, Le Vaill.

MUSCIPETA BREVIROSTRIS. Mas. *Musc. capite, collo, nuchâ, dorso superiori, alis, rectricibusque mediis splendenti-nigris; corpore infra, dorso imo, pteromatum apicibus, fasciâ remigum, rectricibusque lateralibus splendidè coccineis; rostro brevi, subdebili.*

MUSCIPETA PRINCEPS. *Musc. capite, collo, dorso summo, alis, rectricibusque duabus mediis nigris; corpore inferiori, dorso imo, fasciâ latâ alarum, maculis paucis remigum secundariarum, rectricibusque lateralibus aurantio-coccineis; rostro fortiori.*

Longitudo circiter 9 uncias.

Genus *Rhipidura.*

29. RHIPIDURA ALBOFRONTATA. *Rhip. capite colloque nigris; dorso cinereo-nigro; alis caudâque fusco-nigris; fasciâ subgracili frontali super oculos ad nucham extendente, pectore, abdomine, maculis tectricum alarum, apicibusque rectricum, duabus mediis exceptis, albis.*

Longitudo 6.

White-browed Flycatcher, Lath.?

30. RHIPIDURA FUSCOVENTRIS. *Rhip. capite nigro; dorso abdomineque cinereo-nigris; alis caudâque fusco-nigris; strigâ brevi superciliari colloque in fronte albis; rectricum trium lateralium apicibus albescentibus.*

Longitudo 7½.

Broad-tailed Flycatcher, Lath.?

RHIPIDURA NIGRITORQUIS. *Rhip. cinereo-grisea; corpore subtùs, rectricumque, duabus mediis exceptis, apicibus albis; fronte, torqueque jugulari nigris; remigibus rectricibusque fuscis.*

Longitudo *corporis*, 7.

Fam. *Laniadæ*.—Genus *Ocypterus*.

31. *Ocypterus leucorhynchus. Lanius leucorhynchus*, Linn. *White-billed Shrike*, Lath. *Pie-grièche de Manille*, Buff.

Genus *Edolius*.

32. *Edolius cærulescens. Lanius cærulescens*, Linn. *Fork-tailed Indian Butcher-bird*, Edw.

Genus *Irena*.

C. IRENA CYANOGASTRA. *Ir. nigrescenti-cyanea; capite suprà, fasciâ tectricum alarum, uropygio, crissoque splendenti-cyaneis; collo in fronte, genis remigibusque atris.*

Staturâ *Irenæ Puellæ*, et simillima; differt abdomine caudâque cyaneis, haud nigris, dorso cyaneo haud lazulino, et rostri culmine plus elevato.

Genus *Hypsipetes*.

HYPSIPETES PSAROÏDES. *Hyps. capite supra subcristato, remigum apicibus, rectricibusque nigris; corpore alisque cineraceo-griseis; abdomine imo crissoque pallidioribus.*

*Rostrum pedes*que flavi. *Tectricum* alarum *remigum*que pogonia interna fusca. *Tectrices* alarum inferiores cineraceo griseæ. Longitudo *corporis*, 11½; *alæ* a carpo ad apicem remigis 3tiæ, 5; *rostri* 1; *tarsi*, ⅝; *caudæ*, 4¼.

Genus *Lanius*.

33. LANIUS MUSCICAPOÏDES. *Lan. brunnescenti-cinereus subtus albescens; strigâ superciliari rufescenti-albâ; alis rectricibusque fusco-brunneis, his duabus lateralibus albis basi notâque ad apicem fusco-brunneis.*

Fœm. aut Mas. jun. *capite corporeque suprà albido maculatis.* Longitudo 6½. *Keroula Shrike*, Lath.?

LANIUS ERYTHROPTERUS. Mas. *Lan. nuchâ dorsoque griseis; capite supra, alis, caudâque atris; corpore subtus, strigâ superciliari, remigumque apicibus albis; alis maculâ latâ rubrânotatis.* Fœm. *Capite griseo; dorso, alis, rectricibusque virescenti-olivaceo notatis; harum apicibus flavis.*

Statura *Lan. Collurionis*.

Genus *Collurio*.

34. *Collurio Excubitor. Lanius Excubitor*, var. Linn. *Cinereous Shrike*, var. C. Lath.

35. *Collurio erythronotus*, Proceed. Zool. Soc. p. 42. *Grey-backed Shrike*, Lath.?

36. CULLURIO NIGRICEPS. *Col. capite suprà, nuchâ, alis, caudâque nigris; gulâ, pectore, abdomine medio, maculâque in medio alarum, albis; dorso cinereo scapularibus, uropygio, abdominis lateribus, crissoque rufis.* Longitudo 8½. *Indian Shrike*, Lath.?

37. *Collurio Hardwickii*, Proceed. Zool. Soc. p. 42. *Bay-backed Shrike*, Lath.?

COLLURIO HARDWICKII. *Coll. capitis parte anteriore, strigâ per oculos ad collum extendente, alis, caudâque nigris; capitis vertice, corpore infra, maculâ mediâ alarum, caudæ tectricibus, rectricibus duabus lateralibus, cæterarumque, quatuor mediis exceptis, basi apiceque albis; occipite, nuchâ, dorsoque imo albescenti-griseis; dorso medio lateribusque abdominis ferrugineis.*

*Rostrum pedes*que nigri. *Caput* supernè albo nigroque colore in duas ferè partes transversim divisum. Longitudo *corporis*, 8; *alæ* a carpo ad remigem 3tiam, $3\frac{1}{2}$; *rostri*, $\frac{3}{4}$; *tarsi*, $\frac{7}{8}$; *caudæ*, $3\frac{3}{4}$.

Bay-backed Shrike, *Lath. ? Gen. Hist. vol.* 11. *p.* 13. *sp.* 6.

This bird appears to be the same as that referred to in Dr. Latham's work, the description of which is taken from one of the drawings of General Hardwicke, to whom the species is inscribed.

COLLURIO ERYTHRONOTUS. *Coll. strigâ frontali per oculos ad medium colli extendente, alis, rectricibusque quatuor mediis nigris; capite supra, nuchâ, dorso superiori, rectricibusque lateralibus pallidè cinereis; corpore infra, alarum maculâ mediâ, remigum interiorum apicibus, rectricum lateralium marginibus omniumque apicibus, albis; scapularibus, dorso imo, abdominisque lateribus ferrugineis.*

*Rostrum pedes*que nigri, illius mandibulâ inferiori ad basin flavescenti. *Striga* per oculos nigra, supra graciliter albo marginata. *Tectrices* alarum inferiores albæ. Longitudo *corporis*, $10\frac{1}{2}$; *alæ* a carpo ad apicem remigis 3tiæ, $3\frac{3}{4}$; *rostri* $\frac{7}{8}$; *tarsi*, $1\frac{1}{8}$; *caudæ*, $4\frac{1}{2}$.

This bird was observed to bear a great resemblance to the description of the *grey-backed Shrike* of Dr. Latham, (*Gen. Hist.* vol. ii. p. 9. sp. 3.) but to differ from it in the colours of the lesser wing-coverts and tail; the former being all black in the Himalayan species, and blue grey, ending in pale rufous in Dr. Latham's; while the tail in the former species had four black middle feathers and the rest cinereous, but in the latter had the two middle ones only black, the rest being white. In a group exhibiting so much similarity in the disposition of the colours as the present, such differences are material as distinguishing species.

COLLURIO TEPHRONOTUS. *Col. fasciâ frontali pergracili ad medium colli per oculos latiùs extendente nigrâ; capite, nuchâ, scapularibus, dorsoque saturatiùs cinereis; collo anteriori pectoreque albescentibus, hoc fusco graciliter fasciato; abdomine crissoque ferrugineis; alis caudâque brunneo-fuscis, apicibus pallidioribus; dorso imo tectricibusque caudæ superioribus subrufescentibus. Tectrices* alarum inferiores ferruginco fuscoque notatæ. Statura paullo minor quàm in specie præcedenti.

This bird also was observed to be closely allied to the last, and to differ from it probably only in sex or age. Until such points however could be ascertained, it was considered advisable to regard it as specifically distinct.

Genus *Graucalus.*

38. *Graucalus Papuensis*, Cuv. *Corvus Papuensis*, Gmel. *Papuan Crow*, Lath.

Genus *Ceblepyris.*

39. *Ceblepyris cana*, Temm. *Muscicapa cana*, Gmel. *Ash-coloured Flycatcher*, Lath.

40. *Ceblepyris fimbriatus*, Temm. *Echenilleur frangé*, Temm.

Fam. *Merulidæ.*—Genus *Pitta.*

41. *Pitta brachyura. Corvus brachyurus*, Linn. *Short-tailed Crow*, var. B. Lath. *Short-tailed Pie*, Edw.

LAMPROTORNIS SPILOPTERUS. Mas. *Lamp. supra plumbeo-canus, plumis ad apicem fusco marginatis; subtus albus, rufo tinctus; uropygio rufescenti; remigibus atris viridi splendentibus, maculâ alba; caudâ brunneâ; gulâ intensè rufâ.*

Fœm. *Supra pallidè brunnea, subtus ulbescens, brunneo tincta.*

Statura *Lamp. cantoris.*

Myophonus Horsfieldii. *Myoph. cœrulescenti-ater, fronte, humeris, marginibusque plumarum pectoris splendidè cœruleis.*

Statura *Myoph. cyanei*, Horsf.

Cinclus Pallasii, Temm. *Cincl. unicolor, intensè brunneus, rostro pedibusque fuscis.*

Statura *Cincli aquatici*, Bechst.

Genus *Oriolus.*

42. *Oriolus Galbula*, Linn. *Golden Oriole*, Lath. *Le Loriot*, Buff.

43. *Oriolus melanocephalus*, Linn. *Black-headed Oriole*, Lath. *Loriot de la Chine*, Buff.

44. Oriolus Maderaspatanus. *Or. fronte, corpore suprà, tectricibus alarum abdomineque luteis; capite suprà, genis, remigibus, notâque mediană rectricum fusco-atris; gulâ albâ striis fusco-atris.* Longitudo 9.

Oriolus Galbula, var. γ. Lath. *Yellow Indian Starling*, Edw. *Yellow Sturling from Bengal*, Albin.

C. Oriolus Acrorhynchus. *Or. aureo-flavus; vittâ a tictu per oculos extendente sincipitque obtegente latâ, remigibus totis, rectricumque basibus nigris; rostro flavo, bulmine elevato.*

Longitudo *corporis*, 12; *alæ* a carpo ad apicem remigis 4tæ, 6; *caudæ*, 4½; *tarsi*, 1; *rostri*, 1⅛.

Genus *Turdus.*

45. *Turdus macrourus*, Gmel. *Long-tailed Thrush*, Lath.

46. *Turdus Saularis. Grucula Saularis*, Linn. *Pastor Saularis*, Temm. *Little Indian Pie*, Edw.

Turdus pœcilopterus. Mas. *Turd. corpore nigro, abdomine imo subcinerascenti-fusco; remigum mediarum pogoniis externis pteromatibusque cineraceo-griseis, his apice albis; rostro pedibusque flavis.*

Fœm.? *Corpore suprà brunnescenti-griseo, subtùs pallidiori; pteromatibus remigumque mediarum pogoniis externis ut in mari notatis, sed colore subrufescenti tinctis.*

Statura ferè *Turdi Merulæ*, Linn.

A new species closely allied to the common European *Blackbird*, exhibiting the yellow bill and general black plumage of that bird, but differing from it in the varied markings of the wing.

Cinclosoma ocellatum. *Cinclos. capitis fronte et lateribus, corporeque suprà rufo-brunneis; vertice, colloque in fronte nigro-brunneis; pectore albescenti-rufo nigro fasciato; abdomine pallidè rufo, nuchâ, dorso, alis, caudæque tectricibus ocellis anticè utris posticè albis, notatis; remigibus et rectricibus luteralibus griseo-fuscis, apicibus albis.*

Rostrum pedis que flavescentes, illius culmine fusco. *Remigum* mediarum pogonia externa grisea, strigam griseam alarem exhibentes. *Tectrices* alarum inferiores rufo nigro albescentique variegatæ. Longitudo *corporis*, 14; *alæ* a carpo ad remigis 6tæ apicem, 5; *rostri*, $\frac{3}{10}$; *tarsi*, $1\frac{7}{10}$; *caudæ*, 7.

[*To be Continued.*]

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of June, 1832.

Days of the Month.	Minimum Temperature observed at sunrise.					Maximum Pressure observed at 9h. 50m.					Max. Temp. and Dryness observed at 2h. 40m.					Minimum Pressure observed at 4h. 0m.					Observations made at sunset.					Observations in Calcutta, at $10\frac{1}{2}$ P. M.					Rain Gauge, No. 1.	Rain Gauge, No. 2.
	Barometer reduced to 32°.	Temper. of the air.	Depres. of M.B.Ther.	Wind.	Aspect of the sky.	Barom. red. to 32°.	Temper. of the air.	Depres. of M.B.Ther.	Wind.	Aspect of the sky.	Barom. red. to 32°.	Temper. of the air.	Depres. of M.B.Ther.	Wind.	Aspect of the sky.	Barom. red. to 32°.	Temper. of the air.	Depres. of M.B.Ther.	Wind.	Aspect of the sky.	Barom. red. to 32°.	Temper. of the air.	Depres. of M.B.Ther.	Wind.	Aspect of the sky.	Barom. red. to 32°.	Temper. of the air.	Depres. of M.B.Ther.	Wind.	Aspect of the sky.		
1	29,542	83,	2,8	s.	cl.	,593	95,3	12,3	s.	cl.	,522	103,	16,1	s.	cu.	,478	100,5	13,	s.	cu.	,505	91,5	8,3	s.	cu.	,573	84,8	3,2	s.	cu.		
2	,533	81,5	1,8	do.	do.	,577	98,3	13,4	s. w.	do.	,511	102,5	17,8	do.	do.	,466	98,3	13,	do.	do.	,492	95,5	11,3	do.	ci.	,586	86,	3,6	do.	cl.		
3	,545	83,5	2,8	do.	do.	,580	95,	11,5	s.	cu.	,475	99,5	14,8	s. e.	do.	,441	95,5	11,3	s. e.	cus.	,499	82,5	6,3	n. e.	n.	,593	83,2	4,2	e.	rn.		
4	,532	83,	2,3	do.	do.	,585	93,	9,8	do.	do.	,492	100,	16,1	do.	do.	,486	98,3	14,8	do.	cu.	,516	91,	8,8	s.	cu.	,616	85,	3,	s.	cl.		
5	,601	83,	2,5	do.	cu.	,648	94,	10,3	do.	do.	,547	103,	18,5	do	do.	,507	99,5	15,	s.	do.	,538	92,	9,8	do.	cis.	,587	82,9	4,8	e.	cus		
6	,590	79,5	3,	do.	cis.	,624	90,5	7,5	do.	do.	,510	98,5	16,8	do.	do.	,482	95,5	13,3	do.	do.	,501	92,	11,8	do.	cu.	,588	86,9	3,6	do.	do.		
7	,548	84,	3,8	do.	cl.	,593	92,	9,3	do.	do.	,503	98,3	16,1	s.	do.	,494	94,3	13,8	s. e.	cus.	,515	90,	8,5	s. e.	do.	,586	85,2	5,2	s. e.	cu.		
8	,543	81,	3,8	s. e.	cu.	,614	94,	15,	s. w.	ci.	,529	103,	22,	s. e.	do.	,501	97,3	16,4	do.	do.	,529	81,5	4,8	do.	do.	,581	83,8	5,	e.	cl.		
9	,547	83,5	3,3	do.	cl.	,592	92,5	9,5	s. e.	cu.	,492	98,	13,	do.	do.	,448	96,3	11,1	do.	ci.	,433	89,5	6,3	do.	do.	,604	83,8	1,1	s. e.	cu.	0,45	0,25
10	,502	81,	3,3	s.	cu.	,516	93,	9,1	s.	do.	,422	96,3	10,6	do.	ci.	,366	95,	9,8	s.	cis.	,408	90,	7,8	s.	do.	,475	88,	1,2	do.	cic.		
11	,433	76,5	2,3	s. e.	n.	,473	86,	4,1	s. e.	cis.	,407	96,8	13,8	s.	do.	,386	96,	11,3	s. e.	do.	,385	89,	6,3	s. e.	do.	,471	80,8	7,8	n.w.	ru.		
12	,437	81,5	4,	do.	cy.	,531	88,	6,8	do.	cu.	,453	91,3	7,4	s. e.	cu.	,439	90,	6,8	do.	cu.	,439	86,5	4,6	do.	cis.	,565	84,5	2,5	s.	cic.	0,50	0,36
13	,365	83,3	3,6	do.	cis.	,548	85,	4,8	n. e.	cis.	,488	94,5	12,3	do.	do.	,462	92,3	10,1	do.	cis.	,436	76,5	1,8	n. e.	n.	,523	78,2	3,2	n.	ru.	1,32	1,24
14	,399	76,	1,8	s.	n.	,537	86,	5,3	s.	cu.	,449	95,5	11,6	do.	do.	,434	94,5	11,	do.	cu.	,407	88,	6,1	s. e.	cu.	,487	85,	4,	s. e.	cu.		
15	,442	81,7	3,2	s. w.	cu.	,511	86,5	6,3	w.	cis.	,439	91,5	8,8	n. e.	cis.	,453	80,	6,1	n. w.	u.	,413	77,	2,5	cm.	n.	,491	80,8	5,	do.	ru.	0,87	0,77
16	,467	78,3	3,1	s.	cus.	,522	92,5	4,8	s. w.	do.	,461	90,	9,5	s.	do.	,442	88,5	5,8	s.	cis.	,431	83,	4,8	do.	cis.	,510	84,5	4,5	do.	cu.	0,42	0,37
17	,504	81,7	1,5	s. e.	cis.	,556	82,5	4,3	e.	do.	,479	89,	5,5	s. e.	do.	,459	88,	5,3	do.	do.	,475	84,5	4,	s. e.	cus.	,540	84,2	4,2	s.w.	cus.		
18	,583	81,	2,8	n. e.	do.	,623	89,	7,5	n. e.	cu.	,601	79,	2,5	cm.	rn.	,560	79,7	3,	e.	n.	,573	79,7	2,5	n. e.	cis.	,545	81,	3,6	cm.	cis.		
19	,621	79,	1,8	do.	n.	,761	86,5	6,5	do.	do.	,596	79,	1,5	n. e.	do.	,567	81,	2,6	n. e.	cus.	,571	81,	2,3	cm.	do.	,626	81,2	2,7	do.	cl.		
20	,610	79,5	1,8	s. e.	rn.	,631	87,5	6,6	s. e.	do.	,548	86,7	6,	s.	cus.	,539	87,8	6,8	s. e.	cis.	,545	84,	4,1	s. e.	ci.	,616	82,3	3,9	s. e.	do.	0,20	0,17
21	,593	79,7	2,2	do.	cus.	,637	84,5	4,5	s.	do.	,578	90,8	11,3	s. e.	do.	,551	90,5	9,8	do.	cu.	,553	85,	5,8	do.	cu.	,629	82,2	3,2	e.	do.		
22	,517	78,	1,8	do.	n.	,656	82,8	3,8	s. e.	cis	,593	85,3	4,3	s.	n.	,558	88,5	8,6	do.	do.	,549	85,3	5,6	do.	do.	,633	82,8	3,6	do.	do.		
23	,611	80,	1,3	do.	cus.	,643	89,3	7,6	do	cu.	,545	89,5	8,5	s. e.	cis.	,513	90,3	8,6	do.	do.	,510	87,	6,8	do.	ci.	,612	84,1	4,5	s. e.	cu.	0,22	0,14
24	,572	81,	1,8	do.	cu.	,602	90,5	7,3	do.	do.	,529	81,5	3,3	s.	n	,525	80,5	2,8	n	n.	,535	81,	2,8	s.	cus.	,551	82,8	4,	s.	cl		
25	,538	81,	2,3	do.	cus.	,574	86,5	5,8	do.	do.	,480	85,5	6,	w. e.	do.	,461	84,8	5,1	cm.	cis.	,465	85,5	4,8	cm.	do.	,544	83,2	3,4	s. e.	do.	0,18	0,10
26	,495	80,	1,8	do.	cu.	,501	90,	8,	do.	do.	,425	97,3	13,8	s. e.	cu.	,422	96,	13,5	s. e.	cu.	,440	88,	7,5	s. e.	cu.	,498	84,	4,5	s.	do		
27	,459	81,	2,3	n. e.	cus.	,522	89,5	7,8	n. e.	do.	,424	86,7	6,	n. e.	n.	,422	82,8	3,6	n. e.	n.	,426	81,3	1,6	n. e.	cis.	,502	85,3	6,	e.	do.		
28	,457	82,	3,3	do.	cu.	,506	85,5	6,3	do.	do.	,416	88,3	7,8	do.	cu.	,377	87,	6,3	do.	cis.	,425	85,	5,3	do.	cu.	,445	84,	5,	do.	do		
29	,416	80,3	1,4	do.	cus.	,467	85,3	4,3	do.	cis.	,409	88,	7,	do.	cis.	,395	87,	5,5	do.	do.	,411	81,7	3,	do.	cis	,457	82,	2,9	u. e.	cu.		
30	,442	79,5	1,8	cu.	rn.	,458	87,5	6,	do.	cu.	,387	83,3	3,8	do.	n.	,358	81,5	1,3	e.	cus.	,364	82,3	2,1	cm.	do.	,420	81,5	2,6	s.	cl.	0,10	0,08
Mean,	29,515	80,8	2,5			,573	89,0	7,5			,460	92,4	10,4			,467	90,6	8,9			,476	85,5	5,6			,526	83,4	3,9			4,26	3,48

Abbreviations. In the column "wind," small letters have been used instead of capitals; *cm.* means *calm.* In the column "aspect of the sky," *cy.* is *cloudy; cl. clear; rn. rain, ci. cirrus; cu. cumulus; cs. cirro-stratus; cus. cumulo-stratus; cc. cirro-cumulus; n. nimbus;*